OneUp Wi-11 Simulator

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Contents

Chapter 1

Main Page

1.1 Introduction

The "Wi-11 Machine" is a simple, 16-bit computer architecture. It has 8 general purpose registers, 3 condition code registers (CCRs), and a program counter (PC). This software package is meant to emulate its execution, as well as present the user with information regarding the state of the machine after each instruction is executed. However, before one can delve into the behind-the-scenes details, one must understand the environment. In particular, an understanding the object file syntax and the interactions between the components used in this project is necessary.

1.2 Object Files

The object files (ususally file_name.o) that this simulator accepts are ascii text files with the following structure:

- One Header Record
- Several Text Records
- One End Record

1.2.1 The Header Record

The Header Record is a single line that prepares the system for the storing the instructions to come.

Components

- A capital 'H'. This designates that it is the Header Record.
- A 6 character "segment name" (anything will do).

- A 4-digit Hexadecimal value that corresponds to the "load address" of the program. Instructions can be written starting at this address.
- A second 4-digit Hexadecimal value that denotes the length of the program-load segment (the size of memory into which the instructions will be loaded).

At a glance: There is an 'H', a segment name, the first location where instructions can be written, and the number of memory locations for instuctions.

1.2.2 Text Records

Following the Header Record are serveral Text Records. Each Text Record corresponds to a single machine instruction and, like the header record, is on a single line.

Components

- A capital 'T'. This designates that it is a Text Record.
- A 4-digit hexadecimal value -- The location in memory at which the instruction will be stored.
- A second 4-digit Hexadecimal value -- The encoding of the instruction to be stored.

At a glance: There is a T, the location to store the instruction, and the instruction itself.

1.2.3 The End Record

The End Record is, as the name would suggest, the last line of the line. Its purpose is to denote the end of instructions to be written and to give an initial value for the PC.

Components

- The End Record begins with a capital 'E'.
- Next, and last, a 4-digit hexadecimal value to be put into the PC.

At a glance: There is an E, and the location in memory from which the first instruction should be fetched.

1.3 Interactions

Chapter 2

Directory Hierarchy

2.1 Directories

This directory hierarchy is sorted roughly, but not completely, alphabetically:

Chapter 3

Class Index

3.1 Class Hierarchy

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

Chapter 4

Class Index

4.1 Class List

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

Chapter 5

File Index

5.1 File List

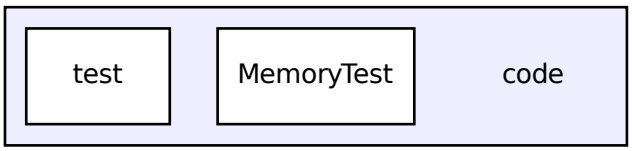
Here is a list of all documented files with brief descriptions:

Chapter 6

Directory Documentation

6.1 code/ Directory Reference

Directory dependency graph for code/:



Directories

- directory MemoryTest
- directory test

Files

- file **iDecoder.h**
- file **iInterpreter.h**
- file **iLoader.h**
- file **iMemory.h**
- file **iObjParser.h**

- file iRegister.h

  Definition of a "register" in the Wi-11 machine.

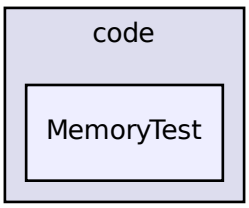
- file **iSimulator.h**
- file **iWi11.h**
- file **iWord.h**
- file **Main.cpp**
- file **Memory.cpp**
- file **Memory.h**
- file **Register.cpp**
- file Register.h

  Definition of private data for the "Register" class.

- file **ResultCodes.h**
- file **Word.cpp**
- file **Word.h**

6.2 code/MemoryTest/ Directory Reference

Directory dependency graph for code/MemoryTest/:

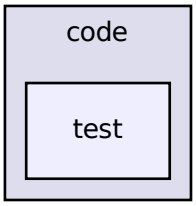


Files

- file **MemoryTest/iMemory.h**
- file **MemoryTest/iWord.h**
- file **MemoryTest/Memory.cpp**
- file **MemoryTest/Memory.h**
- file **MemoryTest.cpp**
- file **MemoryTest/ResultCodes.h**
- file **MemoryTest/Word.cpp**
- file **MemoryTest/Word.h**

6.3 code/test/ Directory Reference

Directory dependency graph for code/test/:



Files

- file **RegisterTest.cpp**
- file **WordTest.cpp**

Chapter 7

Class Documentation

7.1 iDecoder Class Reference

Public Member Functions

- virtual Instruction **DecodeInstruction** (const iWord &) const =0

7.2 iInterpreter Class Reference

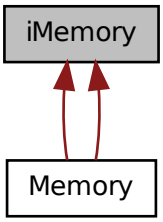
7.3 iLoader Class Reference

Public Member Functions

- virtual **iLoader** (iMemory *)=0
- virtual Codes::RESULT **Load** (const char *filename, iWord &PC_address)=0

7.4 iMemory Class Reference

Inheritance diagram for iMemory:



Public Member Functions

- virtual Codes::RESULT **Reserve** (const iWord &initial_address, const iWord &length)=0

- virtual Word **Load** (const iWord &) const =0
- virtual Codes::RESULT **Store** (const iWord &address, const Word &value)=0
- virtual Codes::RESULT **Reserve** (const iWord &initial_address, const iWord &length)=0

- virtual Word **Load** (const iWord &) const =0
- virtual Codes::RESULT **Store** (const iWord &address, const Word &value)=0

7.5 Instruction Struct Reference

Public Attributes

- INSTRUCTION_TYPE **type**
- std::vector< Word > **data**

7.6 iObjParser Class Reference

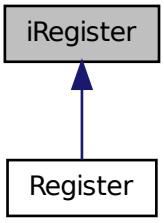
Public Member Functions

- virtual Codes::Result **Initialize** (const char *)=0
- virtual ObjectData **GetNext** ()=0

7.7 iRegister Class Reference

Defines a "register" in the Wi-11 machine.

Inheritance diagram for iRegister:



Public Member Functions

- virtual Word GetValue () const =0

  Retrieves a copy of the word of data store in the register.

- virtual void Add (const iWord &w)=0

  Adds a word of data to the calling object.

- virtual Register Add (const iRegister &r) const =0

  Adds a word of data to the calling object.

- virtual Register operator+ (const iRegister &r) const =0

  A standard add operator.

- virtual void Subtract (const iWord &w)=0

  Subtracts a word of data from the calling object.

- virtual Register Subtract (const iRegister &r) const =0

  Subtracts a word of data from the calling object.

- virtual Register operator- (const iRegister &r) const =0

  A standard subtraction operator.

- virtual void And (const iWord &w)=0

  Performs a bit-wise and.

- virtual Register And (const iRegister &r) const =0

  Performs a bit-wise and.

- virtual void Or (const iWord &w)=0

  Performs a bit-wise "or".

- virtual Register Or (const iRegister &r) const =0

  Performs a bit-wise or.

- virtual void Not ()=0

  Performs a bit-wise not.

- virtual Register Not () const =0

  Performs a bit-wise not.

- virtual void Store (const iWord &w)=0

  Stores a word of data.

- virtual void Store (const iRegister &r)=0

  Stores a copy of another register.

- virtual Register & operator= (const iWord &w)=0

  A standard assignment operator.

- virtual Register & operator= (const Register r)=0

  A standard assignment operator.

- virtual Register & operator++ ()=0

  A standard pre-increment operator.

- virtual Register & operator++ (int)=0

  A standard post-increment operator.

7.7.1 Detailed Description

Defines a "register" in the Wi-11 machine. The methods present in this inteface are meant to mimic the functionality of the Wi-11 machine, allowing for simplified execution of the instructions therein. This interace class will serve as a base from which the general purpose registers and program counter of the Wi-11 can be defined.

7.7.2 Member Function Documentation

7.7.2.1 virtual Word iRegister::GetValue ( ) const [pure virtual]

Retrieves a copy of the word of data store in the register.

Postcondition

The value of the calling object is not changed.

Returns

A new Word object holding the value that is stored in the register.

Implemented in Register.

7.7.2.2 virtual void iRegister::Add (const iWord & *w*) [pure virtual]

Adds a word of data to the calling object.

Parameters

in	*w*	The value to be added.

Postcondition

The calling object equals its previous value plus the value of "w"; "w", however, will remain unchanged.

Implemented in Register.

7.7.2.3 virtual Register iRegister::Add (const iRegister & *r*) const [pure virtual]

Adds a word of data to the calling object.

Parameters

in	*r*	The value to be added.

Postcondition

Both the calling object and "r" will not be changed.

Returns

A new Register object holding the value of the calling object plus the value in "r".

Implemented in Register.

7.7.2.4 virtual Register iRegister::operator+ (const iRegister & *r*) const [pure virtual]

A standard add operator.

Note

"result = p + r" is equivalent to "result = p.Add(r)".

Implemented in Register.

7.7.2.5 virtual void iRegister::Subtract (const iWord & *w*) [pure virtual]

Subtracts a word of data from the calling object.

Parameters

in	*w*	The value to be subtracted.

Postcondition

The calling object equals its previous value minus the value of "w"; "w", however, will remain unchanged.

Implemented in Register.

7.7.2.6 virtual Register iRegister::Subtract (const iRegister & *r*) const [pure virtual]

Subtracts a word of data from the calling object.

Parameters

in	*r*	The value to be subtracted.

Postcondition

Both the calling object and "r" will not be changed.

Returns

A new Register object holding the value of the calling object minus the value in "r".

Implemented in Register.

7.7.2.7 virtual Register iRegister::operator- (const iRegister & *r*) const [pure virtual]

A standard subtraction operator.

Note

"result = p - r" is equivalent to "result = r.Subtract(w)".

Implemented in Register.

7.7.2.8 virtual void iRegister::And (const iWord & *w*) [pure virtual]

Performs a bit-wise and.

Parameters

in	*w*	The value to be "and"ed.

Postcondition

The calling object equals its previous value bit-wise and'ed with w.

Implemented in Register.

7.7.2.9 virtual Register iRegister::And (const iRegister & *r*) const [pure virtual]

Performs a bit-wise and.

Parameters

in	*r*	The value to be "and"ed.

Postcondition

Both the calling object and r are not changed.

Returns

A new Register object holding the value of the calling object bit-wise and'ed with r.

Implemented in Register.

7.7.2.10 virtual void iRegister::Or (const iWord & *w*) [pure virtual]

Performs a bit-wise "or".

Parameters

in	*w*	The value to be "or"ed.

Postcondition

The calling object equals its previous value bit-wise or'ed with w.

Implemented in Register.

7.7.2.11 virtual Register iRegister::Or (const iRegister & *r*) const [pure virtual]

Performs a bit-wise or.

Parameters

in	*r*	The value to be "or"ed.

Postcondition

Both the calling object and r are not changed.

Returns

A new Register object holding the value of the calling object bit-wise or'ed with r.

Implemented in Register.

7.7.2.12 virtual void iRegister::Not ( ) [pure virtual]

Performs a bit-wise not.

Postcondition

The calling object's bits are all flipped (e.g. 1001 -> 0110).

Implemented in Register.

7.7.2.13 virtual Register iRegister::Not ( ) const [pure virtual]

Performs a bit-wise not.

Postcondition

The calling object is not changed.

Returns

A new Register object holding the bit-wise not of the calling object.

Implemented in Register.

7.7.2.14 virtual void iRegister::Store (const iWord & *w*) [pure virtual]

Stores a word of data.

Parameters

in	*w*	The value to be store.

Postcondition

The calling object's value is now "w".

Implemented in Register.

7.7.2.15 virtual void iRegister::Store (const iRegister & *r*) [pure virtual]

Stores a copy of another register.

Parameters

in	*r*	The register to be copied.

Postcondition

The calling object's value is now "r".

Implemented in Register.

7.7.2.16 virtual Register& iRegister::operator= (const iWord & *w*) [pure virtual]

A standard assignment operator.

Note

"r = w" is equivalent to "r.Store(w)"

Implemented in Register.

7.7.2.17 virtual Register& iRegister::operator= (const Register *r*) [pure virtual]

A standard assignment operator.

Note

"r1 = r2" is equivalent to "r1.Store(r2)"

Implemented in Register.

7.7.2.18 virtual Register& iRegister::operator++ ( ) [pure virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implemented in Register.

7.7.2.19 virtual Register& iRegister::operator++ (int) [pure virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implemented in Register.

7.8 iSimulator Class Reference

Public Member Functions

- virtual bool **Initialize** (const char *)=0
- virtual bool **Add** (const REGISTER_ID DR, const REGISTER_ID SR1, const REGISTER_ID SR2)=0
- virtual bool **Add** (const REGISTER_ID DR, const REGISTER_ID SR1, const iWord &immediate)=0
- virtual bool **And** (const REGISTER_ID DR, const REGISTER_ID SR1, const REGISTER_ID SR2)=0
- virtual bool **And** (const REGISTER_ID DR, const REGISTER_ID SR1, const iWord &immediate)=0
- virtual bool **Branch** (const iWord &address)=0
- virtual bool **Debug** ()=0
- virtual bool **JSR** (const iWord &)=0
- virtual bool **JSRR** (const iWord &baseR, const iWord &address)=0
- virtual bool **Load** (const REGISTER_ID DR, const iWord &address)=0
- virtual bool **LDI** (const REGISTER_ID DR, const iWord &address)=0
- virtual bool **LDR** (const REGISTER_ID DR, const iWord &baseR, const iWord &address)=0
- virtual bool **Not** (const REGISTER_ID DR, const REGISTER_ID SR)=0
- virtual bool **Ret** ()=0
- virtual bool **Store** (const REGISTER_ID DR, const iWord &address)=0
- virtual bool **STI** (const REGISTER_ID DR, const iWord &address)=0
- virtual bool **STR** (const REGISTER_ID DR, const iWord &baseR, const iWord &address)=0
- virtual bool **Trap** (const iWord &address)=0

7.9 iWi11 Class Reference

Public Member Functions

- virtual bool **LoadObj** (const char *)=0

- virtual void **DisplayMemory** () const =0
- virtual void **DisplayRegisters** () const =0
- virtual bool **ExecuteNext** (bool verbose=false)=0

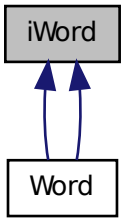
Private Member Functions

- virtual iRegister & **_GetRegister** (const Decoder::REGISTER_ID &)=0
- virtual Codes::RESULT **_Add** (const Decoder::REGISTER_ID DR, const Decoder::REGISTER_-ID SR1, const Decoder::REGISTER_ID SR2)=0
- virtual Codes::RESULT **_Add** (const Decoder::REGISTER_ID DR, const Decoder::REGISTER_-ID SR1, const iWord &immediate)=0
- virtual Codes::RESULT **_And** (const Decoder::REGISTER_ID DR, const Decoder::REGISTER_-ID SR1, const Decoder::REGISTER_ID SR2)=0
- virtual Codes::RESULT **_And** (const Decoder::REGISTER_ID DR, const Decoder::REGISTER_-ID SR1, const iWord &immediate)=0
- virtual Codes::RESULT **_Branch** (const iWord &address)=0
- virtual Codes::RESULT **_Debug** ()=0
- virtual Codes::RESULT **_JSR** (const iWord &)=0
- virtual Codes::RESULT **_JSRR** (const iWord &baseR, const iWord &address)=0
- virtual Codes::RESULT **_Load** (const Decoder::REGISTER_ID DR, const iWord &address)=0
- virtual Codes::RESULT **_LoadI** (const Decoder::REGISTER_ID DR, const iWord &address)=0
- virtual Codes::RESULT **_LoadR** (const Decoder::REGISTER_ID DR, Decoder::REGISTER_-ID baseR, const iWord &address)=0
- virtual Codes::RESULT **_Not** (const Decoder::REGISTER_ID DR, const Decoder::REGISTER_-ID SR)=0
- virtual Codes::RESULT **_Ret** ()=0
- virtual Codes::RESULT **_Store** (const Decoder::REGISTER_ID SR1, const iWord &address)=0
- virtual Codes::RESULT **_STI** (const Decoder::REGISTER_ID SR1, const iWord &address)=0
- virtual Codes::RESULT **_STR** (const Decoder::REGISTER_ID SR1, const Decoder::REGISTER_-ID baseR, const iWord &address)=0
- virtual Codes::RESULT **_Trap** (const iWord &code)=0

7.10 iWord Class Reference

Defines a "word" of data on the Wi-11 Machine.

Inheritance diagram for iWord:



Public Member Functions

- virtual int ToInt () const =0

  "To non-negative Integer"

- virtual int ToInt2Complement () const =0

  "To Integer as 2's Complement"

- virtual std::string ToStr () const =0

  "To String"

- virtual std::string ToHex () const =0

  "To Hexadecimal"

- virtual bool FromInt (int value)=0

  "From Integer"

- virtual bool FromStr (const std::string &str)=0

  "From String"

- virtual bool FromHex (const std::string &str)=0

  "From Hexadecimal"

- virtual Word Add (const iWord &w) const =0

  Adds two words.

- virtual Word operator+ (const iWord &w) const =0

  A standard addition operator.

- virtual Word Subtract (const iWord &w) const =0

  Subtracts two words.

- virtual Word operator- (const iWord &w) const =0

  A standard subtraction operator.

- virtual Word And (const iWord &w) const =0

  "And"s the bits of two words.

- virtual Word Or (const iWord &w) const =0

  "Or"s the bits of two words.

- virtual Word Not () const =0

  "Not"s the bits of a word.

- virtual void Copy (const iWord &w)=0

  Copies a word.

- virtual Word & operator= (const Word w)=0

  A standard assignment operator.

- virtual iWord & operator++ ()=0

  A standard pre-increment operator.

- virtual iWord & operator++ (int)=0

  A standard post-increment operator.

- virtual bool operator[] (const int i) const =0

  An accessor to the 'i'th bit of the value.

- virtual int toInt () const =0

  "To non-negative Integer"

- virtual int toInt2Complement () const =0

  "To Integer as 2's Complement"

- virtual std::string toStr () const =0

  "To String"

- virtual std::string toHex () const =0

  "To Hexadecimal"

- virtual bool fromInt (int value)=0

  "From Integer"

- virtual bool fromStr (const std::string &str)=0

"From String"

- virtual bool fromHex (const std::string &str)=0
  "From Hexadecimal"
- virtual Word Add (const iWord &w) const =0
  Adds two words.
- virtual Word operator+ (const iWord &w) const =0
  A standard addition operator.
- virtual Word Subtract (const iWord &w) const =0
  Subtracts two words.
- virtual Word operator- (const iWord &w) const =0
  A standard subtraction operator.
- virtual Word And (const iWord &w) const =0
  "And"s the bits of two words.
- virtual Word Or (const iWord &w) const =0
  "Or"s the bits of two words.
- virtual Word Not () const =0
  "Not"s the bits of a word.
- virtual void copy (const iWord &w)=0
  Copies a word.
- virtual Word & operator= (const Word w)=0
  A standard assignment operator.
- virtual iWord & operator++ ()=0
  A standard pre-increment operator.
- virtual iWord & operator++ (int)=0
  A standard post-increment operator.
- virtual bool operator[] (const int i) const =0
  An accessor to the 'i'th bit of the value.

7.10.1 Detailed Description

Defines a "word" of data on the Wi-11 Machine. The methods present in this inteface are meant to mimic the functionality of the Wi-11 machine, allowing for simplified execution of the instructions therein. As the size of a "word" depends on the architecture, classes implementing this interface should define the word length to be 16 bits in length.

7.10.2 Member Function Documentation

7.10.2.1 virtual int iWord::ToInt ( ) const [pure virtual]

"To non-negative Integer"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a positive integer value.

Implemented in Word.

7.10.2.2 virtual int iWord::ToInt2Complement ( ) const [pure virtual]

"To Integer as 2's Complement"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a signed (2's complement) integer value.

Implemented in Word.

7.10.2.3 virtual std::string iWord::ToStr ( ) const [pure virtual]

"To String"

Postcondition

The value of the word is not changed.

Returns

16 characters: each either a 1 or 0

Examples:

If the object holds a (2's comp.) value 4: "0000000000000100"
If the object holds a (2's comp.) value -1: "1111111111111111"

Implemented in Word.

7.10.2.4 virtual std::string iWord::ToHex ( ) const [pure virtual]

"To Hexadecimal"

Postcondition

The value of the word is not changed.

Returns

"0x" + <4 characters in the range [0-9],[A-F]>

Examples:

If the object holds (2's comp.) value 8: "0x0008"
If the object holds (2's comp.) value -2: "0xFFFE"

Implemented in Word.

7.10.2.5 virtual bool iWord::FromInt (int *value*) [pure virtual]

"From Integer"

Parameters

in	*value*	The value to be stored into the word.

Postcondition

"value" is not changed.

Returns

True if and only if "value" can be represented in 16 bits

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "value".

Implemented in Word.

7.10.2.6 virtual bool iWord::FromStr (const std::string & *str*) [pure virtual]

"From String"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toStr()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implemented in Word.

7.10.2.7 virtual bool iWord::FromHex (const std::string & *str*) [pure virtual]

"From Hexadecimal"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toHex()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implemented in Word.

7.10.2.8 virtual Word iWord::Add (const iWord & *w*) const [pure virtual]

Adds two words.

Parameters

in	*w*	A word value to be added.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing result of adding "w" and the calling object.

Note

The addition is carried out with no regard to logical overflow.

Implemented in Word, and Word.

7.10.2.9 virtual Word iWord::operator+ (const iWord & *w*) const [pure virtual]

A standard addition operator.

Note

"result = p + w" is equivalent to "result = p.Add(w)".

Implemented in Word, and Word.

7.10.2.10 virtual Word iWord::Subtract (const iWord & *w*) const [pure virtual]

Subtracts two words.

Parameters

in	*w*	A word value to be subtracted.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of subtracting "w" from the calling object.

Note

The subtraction is carried out with no regard for logical overflow.

Implemented in Word, and Word.

7.10.2.11 virtual Word iWord::operator- (const iWord & *w*) const [pure virtual]

A standard subtraction operator.

Note

"result = p - w" is equivalent to "result = p.Subtract(w)".

Implemented in Word, and Word.

7.10.2.12 virtual Word iWord::And (const iWord & *w*) const [pure virtual]

"And"s the bits of two words.

Parameters

in	*w*	A word value to be "and"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise and on "w" and the calling object.

Implemented in Word, and Word.

7.10.2.13 virtual Word iWord::Or (const iWord & *w*) const [pure virtual]

"Or"s the bits of two words.

Parameters

in	*w*	A word value to be "or"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise or on "w" and the calling object.

Implemented in Word, and Word.

7.10.2.14 virtual Word iWord::Not ( ) const [pure virtual]

"Not"s the bits of a word.

Postcondition

The calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise not on the calling object.

Implemented in Word, and Word.

7.10.2.15 virtual void iWord::Copy (const iWord & *w*) [pure virtual]

Copies a word.

Parameters

out	*w*	The value to be copied.

Postcondition

The caller equals that parameter.

Equivalent to the assignment "caller = parameter".

Implemented in Word.

7.10.2.16 virtual Word& iWord::operator= (const Word *w*) [pure virtual]

A standard assignment operator.

Parameters

in	*w*	The value to be copied.

Returns

A copy of the parameter.

The return value and parameter here must be declared as "Word"s as C++ does not work well with polymorphic assignment operators.

Implemented in Word, and Word.

7.10.2.17 virtual iWord& iWord::operator++ ( ) [pure virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implemented in Word, and Word.

7.10.2.18 virtual iWord& iWord::operator++ (int) [pure virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implemented in Word, and Word.

7.10.2.19 virtual bool iWord::operator[] (const int *i*) const [pure virtual]

An accessor to the 'i'th bit of the value.

Parameters

in	*i*	The index of the bit in question.

Precondition

The index must be less than the size of a word, ie. 16.

Returns

True <=> 1, False <=> 0.

The number of the bits starts at zero and rises into the more significant bits.

Examples:

If the object holds a value of 4 (0...100 in binary): num[2] = 1.
If it holds a value of 1 (0...001 in binary): num[0] = 1.
If it holds a negative value (Starting with a 1 in 2's complement): num[15] = 1.

Implemented in Word, and Word.

7.10.2.20 virtual int iWord::toInt ( ) const [pure virtual]

"To non-negative Integer"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a positive integer value.

Implemented in Word.

7.10.2.21 virtual int iWord::toInt2Complement ( ) const [pure virtual]

"To Integer as 2's Complement"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a signed (2's complement) integer value.

Implemented in Word.

7.10.2.22 virtual std::string iWord::toStr ( ) const [pure virtual]

"To String"

Postcondition

The value of the word is not changed.

Returns

16 characters: each either a 1 or 0

Examples:

If the object holds a (2's comp.) value 4: "0000000000000100"
If the object holds a (2's comp.) value -1: "1111111111111111"

Implemented in Word.

7.10.2.23 virtual std::string iWord::toHex ( ) const [pure virtual]

"To Hexadecimal"

Postcondition

The value of the word is not changed.

Returns

"0x" + <4 characters in the range [0-9],[A-F]>

Examples:

If the object holds (2's comp.) value 8: "0x0008"
If the object holds (2's comp.) value -2: "0xFFFE"

Implemented in Word.

7.10.2.24 virtual bool iWord::fromInt (int *value*) [pure virtual]

"From Integer"

Parameters

in	*value*	The value to be stored into the word.

Postcondition

"value" is not changed.

Returns

True if and only if "value" can be represented in 16 bits

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "value".

Implemented in Word.

7.10.2.25 virtual bool iWord::fromStr (const std::string & *str*) [pure virtual]

"From String"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toStr()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implemented in Word.

7.10.2.26 virtual bool iWord::fromHex (const std::string & *str*) [pure virtual]

"From Hexadecimal"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toHex()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implemented in Word.

7.10.2.27 virtual Word iWord::Add (const iWord & *w*) const [pure virtual]

Adds two words.

Parameters

in	*w*	A word value to be added.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing result of adding "w" and the calling object.

Note

The addition is carried out with no regard to logical overflow.

Implemented in Word, and Word.

7.10.2.28 virtual Word iWord::operator+ (const iWord & *w*) const [pure virtual]

A standard addition operator.

Note

"result = p + w" is equivalent to "result = p.Add(w)".

Implemented in Word, and Word.

7.10.2.29 virtual Word iWord::Subtract (const iWord & *w*) const [pure virtual]

Subtracts two words.

Parameters

in	*w*	A word value to be subtracted.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of subtracting "w" from the calling object.

Note

The subtraction is carried out with no regard for logical overflow.

Implemented in Word, and Word.

7.10.2.30 virtual Word iWord::operator- (const iWord & *w*) const [pure virtual]

A standard subtraction operator.

Note

"result = p - w" is equivalent to "result = p.Subtract(w)".

Implemented in Word, and Word.

7.10.2.31 virtual Word iWord::And (const iWord & *w*) const [pure virtual]

"And"s the bits of two words.

Parameters

in	*w*	A word value to be "and"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise and on "w" and the calling object.

Implemented in Word, and Word.

7.10.2.32 virtual Word iWord::Or (const iWord & *w*) const [pure virtual]

"Or"s the bits of two words.

Parameters

in	*w*	A word value to be "or"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise or on "w" and the calling object.

Implemented in Word, and Word.

7.10.2.33 virtual Word iWord::Not ( ) const [pure virtual]

"Not"s the bits of a word.

Postcondition

The calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise not on the calling object.

Implemented in Word, and Word.

7.10.2.34 virtual void iWord::copy (const iWord & *w*) [pure virtual]

Copies a word.

Parameters

out	*w*	The value to be copied.

Postcondition

The caller equals that parameter.

Equivalent to the assignment "caller = parameter".

Implemented in Word.

7.10.2.35 virtual Word& iWord::operator= (const Word *w*) [pure virtual]

A standard assignment operator.

Parameters

in	*w*	The value to be copied.

Returns

A copy of the parameter.

The return value and parameter here must be declared as "Word"s as C++ does not work well with polymorphic assignment operators.

Implemented in Word, and Word.

7.10.2.36 virtual iWord& iWord::operator++ ( ) [pure virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implemented in Word, and Word.

7.10.2.37 virtual iWord& iWord::operator++ (int) [pure virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implemented in Word, and Word.

7.10.2.38 virtual bool iWord::operator[] (const int *i*) const [pure virtual]

An accessor to the 'i'th bit of the value.

Parameters

in	*i*	The index of the bit in question.

Precondition

The index must be less than the size of a word, ie. 16.

Returns

True <=> 1, False <=> 0.

The number of the bits starts at zero and rises into the more significant bits.

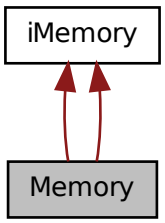
Examples:

If the object holds a value of 4 (0...100 in binary): num[2] = 1.
If it holds a value of 1 (0...001 in binary): num[0] = 1.
If it holds a negative value (Starting with a 1 in 2's complement): num[15] = 1.

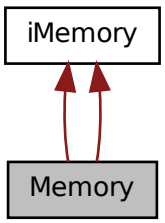
Implemented in Word, and Word.

7.11 Memory Class Reference

Inheritance diagram for Memory:



Collaboration diagram for Memory:



Public Member Functions

- virtual Codes::RESULT **Reserve** (const iWord &initial_address, const iWord &length)

- virtual Word **Load** (const iWord &) const
- virtual Codes::RESULT **Store** (const iWord &address, const Word &value)
- virtual Codes::RESULT **Reserve** (const iWord &initial_address, const iWord &length)

- virtual Word **Load** (const iWord &) const
- virtual Codes::RESULT **Store** (const iWord &address, const Word &value)

Private Attributes

- std::vector< Word * > **_bounded_memory**
- std::vector< int > **_segment_offsets**
- std::vector< int > **_segment_lengths**
- std::map< int, Word > **_unbounded_memory**

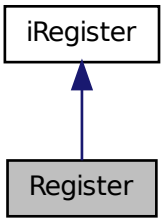
7.12 ObjectData Struct Reference

Public Attributes

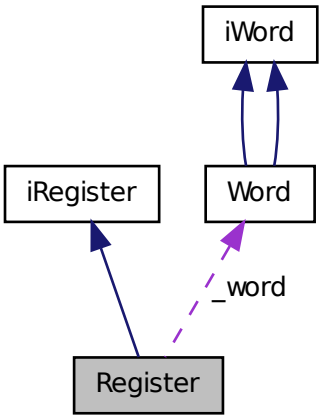
- char **type**
- std::vector< std::string > **data**

7.13 Register Class Reference

Inheritance diagram for Register:



Collaboration diagram for Register:



Public Member Functions

- **Register** (const Word w)
- Word GetValue () const

  Retrieves a copy of the word of data store in the register.

- void Add (const iWord &w)

  Adds a word of data to the calling object.

- Register Add (const iRegister &r) const

  Adds a word of data to the calling object.

- Register operator+ (const iRegister &r) const

  A standard add operator.

- void Subtract (const iWord &w)

  Subtracts a word of data from the calling object.

- Register Subtract (const iRegister &r) const

  Subtracts a word of data from the calling object.

- Register operator- (const iRegister &r) const

  A standard subtraction operator.

- void And (const iWord &w)

  Performs a bit-wise and.

- Register And (const iRegister &r) const

  Performs a bit-wise and.

- void Or (const iWord &w)

  Performs a bit-wise "or".

- Register Or (const iRegister &r) const

  Performs a bit-wise or.

- void Not ()

  Performs a bit-wise not.

- Register Not () const

  Performs a bit-wise not.

- void Store (const iWord &w)

  Stores a word of data.

- void Store (const iRegister &r)

  Stores a copy of another register.

- Register & operator= (const iWord &w)

  A standard assignment operator.

- Register & operator= (const Register r)

  A standard assignment operator.

- Register & operator++ ()

  A standard pre-increment operator.

- Register & operator++ (int)

  A standard post-increment operator.

Private Attributes

- Word _word

  The word of data held in the register.

7.13.1 Member Function Documentation

7.13.1.1 Word Register::GetValue ( ) const [virtual]

Retrieves a copy of the word of data store in the register.

Postcondition

The value of the calling object is not changed.

Returns

A new Word object holding the value that is stored in the register.

Implements iRegister.

7.13.1.2 void Register::Add (const iWord & *w*) [virtual]

Adds a word of data to the calling object.

Parameters

in	*w*	The value to be added.

Postcondition

The calling object equals its previous value plus the value of "w"; "w", however, will remain unchanged.

Implements iRegister.

7.13.1.3 Register Register::Add (const iRegister & *r*) const [virtual]

Adds a word of data to the calling object.

Parameters

in	*r*	The value to be added.

Postcondition

Both the calling object and "r" will not be changed.

Returns

A new Register object holding the value of the calling object plus the value in "r".

Implements iRegister.

7.13.1.4 Register Register::operator+ (const iRegister & *r*) const [virtual]

A standard add operator.

Note

"result = p + r" is equivalent to "result = p.Add(r)".

Implements iRegister.

7.13.1.5 void Register::Subtract (const iWord & *w*) [virtual]

Subtracts a word of data from the calling object.

Parameters

in	*w*	The value to be subtracted.

Postcondition

The calling object equals its previous value minus the value of "w"; "w", however, will remain unchanged.

Implements iRegister.

7.13.1.6 Register Register::Subtract (const iRegister & *r*) const [virtual]

Subtracts a word of data from the calling object.

Parameters

in	*r*	The value to be subtracted.

Postcondition

Both the calling object and "r" will not be changed.

Returns

A new Register object holding the value of the calling object minus the value in "r".

Implements iRegister.

7.13.1.7 Register Register::operator- (const iRegister & *r*) const [virtual]

A standard subtraction operator.

Note

"result = p - r" is equivalent to "result = r.Subtract(w)".

Implements iRegister.

7.13.1.8 void Register::And (const iWord & *w*) [virtual]

Performs a bit-wise and.

Parameters

in	*w*	The value to be "and"ed.

Postcondition

The calling object equals its previous value bit-wise and'ed with w.

Implements iRegister.

7.13.1.9 Register Register::And (const iRegister & *r*) const [virtual]

Performs a bit-wise and.

Parameters

in	*r*	The value to be "and"ed.

Postcondition

Both the calling object and r are not changed.

Returns

A new Register object holding the value of the calling object bit-wise and'ed with r.

Implements iRegister.

7.13.1.10 void Register::Or (const iWord & *w*) [virtual]

Performs a bit-wise "or".

Parameters

in	*w*	The value to be "or"ed.

Postcondition

The calling object equals its previous value bit-wise or'ed with w.

Implements iRegister.

7.13.1.11 Register Register::Or (const iRegister & *r*) const [virtual]

Performs a bit-wise or.

Parameters

in	*r*	The value to be "or"ed.

Postcondition

Both the calling object and r are not changed.

Returns

A new Register object holding the value of the calling object bit-wise or'ed with r.

Implements iRegister.

7.13.1.12 void Register::Not ( ) [virtual]

Performs a bit-wise not.

Postcondition

The calling object's bits are all flipped (e.g. 1001 -> 0110).

Implements iRegister.

7.13.1.13 Register Register::Not ( ) const [virtual]

Performs a bit-wise not.

Postcondition

The calling object is not changed.

Returns

A new Register object holding the bit-wise not of the calling object.

Implements iRegister.

7.13.1.14 void Register::Store (const iWord & *w*) [virtual]

Stores a word of data.

Parameters

in	*w*	The value to be store.

Postcondition

The calling object's value is now "w".

Implements iRegister.

7.13.1.15 void Register::Store (const iRegister & *r*) [virtual]

Stores a copy of another register.

Parameters

in	*r*	The register to be copied.

Postcondition

The calling object's value is now "r".

Implements iRegister.

7.13.1.16 Register & Register::operator= (const iWord & *w*) [virtual]

A standard assignment operator.

Note

"r = w" is equivalent to "r.Store(w)"

Implements iRegister.

7.13.1.17 Register & Register::operator= (const Register *r*) [virtual]

A standard assignment operator.

Note

"r1 = r2" is equivalent to "r1.Store(r2)"

Implements iRegister.

7.13.1.18 Register & Register::operator++ ( ) [virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implements iRegister.

7.13.1.19 Register & Register::operator++ (int) [virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implements iRegister.

7.14 ResultDecoder Class Reference

Public Member Functions

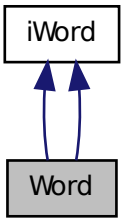
- std::string **Find** (const Codes::RESULT &) const
- std::string **Find** (const Codes::RESULT &) const

Static Private Attributes

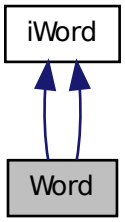
- static std::map< Codes::RESULT, std::string > **_codes**

7.15 Word Class Reference

Inheritance diagram for Word:



Collaboration diagram for Word:



Public Member Functions

- int toInt () const
  "To non-negative Integer"
- int toInt2Complement () const
  "To Integer as 2's Complement"
- std::string toStr () const
  "To String"
- std::string toHex () const
  "To Hexadecimal"
- bool fromInt (int value)
  "From Integer"
- bool fromStr (const std::string &str)
  "From String"
- bool fromHex (const std::string &str)
  "From Hexadecimal"
- Word Add (const iWord &w) const
  Adds two words.
- Word operator+ (const iWord &w) const
  A standard addition operator.

- Word Subtract (const iWord &w) const

  Subtracts two words.

- Word operator- (const iWord &w) const

  A standard subtraction operator.

- Word And (const iWord &w) const

  "And"s the bits of two words.

- Word Or (const iWord &w) const

  "Or"s the bits of two words.

- Word Not () const

  "Not"s the bits of a word.

- void copy (const iWord &w)

  Copies a word.

- Word & operator= (const Word w)

  A standard assignment operator.

- iWord & operator++ ()

  A standard pre-increment operator.

- iWord & operator++ (int)

  A standard post-increment operator.

- bool operator[] (const int i) const

  An accessor to the 'i'th bit of the value.

- int ToInt () const

  "To non-negative Integer"

- int ToInt2Complement () const

  "To Integer as 2's Complement"

- std::string ToStr () const

  "To String"

- std::string ToHex () const

  "To Hexadecimal"

- bool FromInt (int value)

  "From Integer"

- bool FromStr (const std::string &str)

"From String"

- bool FromHex (const std::string &str)

  "From Hexadecimal"

- Word Add (const iWord &w) const

  Adds two words.

- Word operator+ (const iWord &w) const

  A standard addition operator.

- Word Subtract (const iWord &w) const

  Subtracts two words.

- Word operator- (const iWord &w) const

  A standard subtraction operator.

- Word And (const iWord &w) const

  "And"s the bits of two words.

- Word Or (const iWord &w) const

  "Or"s the bits of two words.

- Word Not () const

  "Not"s the bits of a word.

- void Copy (const iWord &w)

  Copies a word.

- Word & operator= (const Word w)

  A standard assignment operator.

- iWord & operator++ ()

  A standard pre-increment operator.

- iWord & operator++ (int)

  A standard post-increment operator.

- bool operator[] (const int i) const

  An accessor to the 'i'th bit of the value.

Private Member Functions

- bool _hasBit (int) const

  Tests for powers of two in binary representation.

- bool _HasBit (int) const

  Tests for powers of two in binary representation.

Private Attributes

- unsigned short _value

  Used to store the "word" of data.

7.15.1 Member Function Documentation

7.15.1.1 bool Word::_hasBit (int *i*) const [private]

Tests for powers of two in binary representation.

Parameters

i	The index of the digit desired from the binary representation of _word.

Returns

True if and only if the 'i'th bit is 1.

The indexing of the bits works as defined in operator[]().

7.15.1.2 int Word::toInt ( ) const [virtual]

"To non-negative Integer"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a positive integer value.

Implements iWord.

7.15.1.3 int Word::toInt2Complement ( ) const [virtual]

"To Integer as 2's Complement"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a signed (2's complement) integer value.

Implements iWord.

7.15.1.4 string Word::toStr ( ) const [virtual]

"To String"

Postcondition

The value of the word is not changed.

Returns

16 characters: each either a 1 or 0

Examples:

If the object holds a (2's comp.) value 4: "0000000000000100"
If the object holds a (2's comp.) value -1: "1111111111111111"

Implements iWord.

7.15.1.5 string Word::toHex ( ) const [virtual]

"To Hexadecimal"

Postcondition

The value of the word is not changed.

Returns

"0x" + <4 characters in the range [0-9],[A-F]>

Examples:

If the object holds (2's comp.) value 8: "0x0008"
If the object holds (2's comp.) value -2: "0xFFFE"

Implements iWord.

7.15.1.6 bool Word::fromInt (int *value*) [virtual]

"From Integer"

Parameters

in	*value*	The value to be stored into the word.

Postcondition

"value" is not changed.

Returns

True if and only if "value" can be represented in 16 bits

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "value".

Implements iWord.

7.15.1.7 bool Word::fromStr (const std::string & *str*) [virtual]

"From String"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toStr()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implements iWord.

7.15.1.8 bool Word::fromHex (const std::string & *str*) [virtual]

"From Hexadecimal"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toHex()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implements iWord.

7.15.1.9 Word Word::Add (const iWord & *w*) const [virtual]

Adds two words.

Parameters

in	*w*	A word value to be added.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing result of adding "w" and the calling object.

Note

The addition is carried out with no regard to logical overflow.

Implements iWord.

7.15.1.10 Word Word::operator+ (const iWord & *w*) const [virtual]

A standard addition operator.

Note

"result = p + w" is equivalent to "result = p.Add(w)".

Implements iWord.

7.15.1.11 Word Word::Subtract (const iWord & *w*) const [virtual]

Subtracts two words.

Parameters

in	*w*	A word value to be subtracted.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of subtracting "w" from the calling object.

Note

The subtraction is carried out with no regard for logical overflow.

Implements iWord.

7.15.1.12 Word Word::operator- (const iWord & *w*) const [virtual]

A standard subtraction operator.

Note

"result = p - w" is equivalent to "result = p.Subtract(w)".

Implements iWord.

7.15.1.13 Word Word::And (const iWord & *w*) const [virtual]

"And"s the bits of two words.

Parameters

in	*w*	A word value to be "and"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise and on "w" and the calling object.

Implements iWord.

7.15.1.14 Word Word::Or (const iWord & *w*) const [virtual]

"Or"s the bits of two words.

Parameters

in	*w*	A word value to be "or"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise or on "w" and the calling object.

Implements iWord.

7.15.1.15 Word Word::Not ( ) const [virtual]

"Not"s the bits of a word.

Postcondition

The calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise not on the calling object.

Implements iWord.

7.15.1.16 void Word::copy (const iWord & *w*) [virtual]

Copies a word.

Parameters

out	*w*	The value to be copied.

Postcondition

The caller equals that parameter.

Equivalent to the assignment "caller = parameter".

Implements iWord.

7.15.1.17 Word & Word::operator= (const Word *w*) [virtual]

A standard assignment operator.

Parameters

in	*w*	The value to be copied.

Returns

A copy of the parameter.

The return value and parameter here must be declared as "Word"s as C++ does not work well with polymorphic assignment operators.

Implements iWord.

7.15.1.18 iWord & Word::operator++ ( ) [virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implements iWord.

7.15.1.19 iWord & Word::operator++ (int) [virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implements iWord.

7.15.1.20 bool Word::operator[] (const int *i*) const [virtual]

An accessor to the 'i'th bit of the value.

Parameters

in	*i*	The index of the bit in question.

Precondition

The index must be less than the size of a word, ie. 16.

Returns

True <=> 1, False <=> 0.

The number of the bits starts at zero and rises into the more significant bits.

Examples:

If the object holds a value of 4 (0...100 in binary): num[2] = 1.
If it holds a value of 1 (0...001 in binary): num[0] = 1.
If it holds a negative value (Starting with a 1 in 2's complement): num[15] = 1.

Implements iWord.

7.15.1.21 bool Word::_HasBit (int *i*) const [private]

Tests for powers of two in binary representation.

Parameters

i	The index of the digit desired from the binary representation of _word.

Returns

True if and only if the 'i'th bit is 1.

The indexing of the bits works as defined in operator[]().

7.15.1.22 int Word::ToInt ( ) const [virtual]

"To non-negative Integer"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a positive integer value.

Implements iWord.

7.15.1.23 int Word::ToInt2Complement ( ) const [virtual]

"To Integer as 2's Complement"

Postcondition

The value of the word is not changed.

Returns

The bits of the word interpreted as a signed (2's complement) integer value.

Implements iWord.

7.15.1.24 string Word::ToStr ( ) const [virtual]

"To String"

Postcondition

The value of the word is not changed.

Returns

16 characters: each either a 1 or 0

Examples:

If the object holds a (2's comp.) value 4: "0000000000000100"
If the object holds a (2's comp.) value -1: "1111111111111111"

Implements iWord.

7.15.1.25 string Word::ToHex ( ) const [virtual]

"To Hexadecimal"

Postcondition

The value of the word is not changed.

Returns

"0x" + <4 characters in the range [0-9],[A-F]>

Examples:

If the object holds (2's comp.) value 8: "0x0008"
If the object holds (2's comp.) value -2: "0xFFFE"

Implements iWord.

7.15.1.26 bool Word::FromInt (int *value*) [virtual]

"From Integer"

Parameters

in	*value*	The value to be stored into the word.

Postcondition

"value" is not changed.

Returns

True if and only if "value" can be represented in 16 bits

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "value".

Implements iWord.

7.15.1.27 bool Word::FromStr (const std::string & *str*) [virtual]

"From String"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toStr()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implements iWord.

7.15.1.28 bool Word::FromHex (const std::string & *str*) [virtual]

"From Hexadecimal"

Parameters

in	*str*	A string of characters meant to represent a "word" to be stored.

Postcondition

"str" is not changed.

Returns

True if and only if "str" is well-formed (as defined in toHex()).

When this function returns "False", the value of the word is unchanged.

Otherwise, the word now holds the value "str".

Implements iWord.

7.15.1.29 Word Word::Add (const iWord & *w*) const [virtual]

Adds two words.

Parameters

in	*w*	A word value to be added.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing result of adding "w" and the calling object.

Note

The addition is carried out with no regard to logical overflow.

Implements iWord.

7.15.1.30 Word Word::operator+ (const iWord & *w*) const [virtual]

A standard addition operator.

Note

"result = p + w" is equivalent to "result = p.Add(w)".

Implements iWord.

7.15.1.31 Word Word::Subtract (const iWord & *w*) const [virtual]

Subtracts two words.

Parameters

in	*w*	A word value to be subtracted.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of subtracting "w" from the calling object.

Note

The subtraction is carried out with no regard for logical overflow.

Implements iWord.

7.15.1.32 Word Word::operator- (const iWord & *w*) const [virtual]

A standard subtraction operator.

Note

"result = p - w" is equivalent to "result = p.Subtract(w)".

Implements iWord.

7.15.1.33 Word Word::And (const iWord & *w*) const [virtual]

"And"s the bits of two words.

Parameters

in	*w*	A word value to be "and"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise and on "w" and the calling object.

Implements iWord.

7.15.1.34 Word Word::Or (const iWord & *w*) const [virtual]

"Or"s the bits of two words.

Parameters

in	*w*	A word value to be "or"ed.

Postcondition

Both "w" and the calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise or on "w" and the calling object.

Implements iWord.

7.15.1.35 Word Word::Not ( ) const [virtual]

"Not"s the bits of a word.

Postcondition

The calling object do not change.

Returns

A new "Word" object containing the result of performing a bit-wise not on the calling object.

Implements iWord.

7.15.1.36 void Word::Copy (const iWord & *w*) [virtual]

Copies a word.

Parameters

out	*w*	The value to be copied.

Postcondition

The caller equals that parameter.

Equivalent to the assignment "caller = parameter".

Implements iWord.

7.15.1.37 Word& Word::operator= (const Word *w*) [virtual]

A standard assignment operator.

Parameters

in	*w*	The value to be copied.

Returns

A copy of the parameter.

The return value and parameter here must be declared as "Word"s as C++ does not work well with polymorphic assignment operators.

Implements iWord.

7.15.1.38 iWord& Word::operator++ ( ) [virtual]

A standard pre-increment operator.

Returns

A reference to itself.

The object increments its value BEFORE the execution of the current line.

Implements iWord.

7.15.1.39 iWord& Word::operator++ (int) [virtual]

A standard post-increment operator.

Returns

A reference to itself.

The object increments its value AFTER the execution of the current line.

Implements iWord.

7.15.1.40 bool Word::operator[] (const int *i*) const [virtual]

An accessor to the 'i'th bit of the value.

Parameters

in	*i*	The index of the bit in question.

Precondition

The index must be less than the size of a word, ie. 16.

Returns

True <=> 1, False <=> 0.

The number of the bits starts at zero and rises into the more significant bits.

Examples:

If the object holds a value of 4 (0...100 in binary): num[2] = 1.
If it holds a value of 1 (0...001 in binary): num[0] = 1.
If it holds a negative value (Starting with a 1 in 2's complement): num[15] = 1.

Implements iWord.

7.15.2 Member Data Documentation

7.15.2.1 unsigned short Word::_value [private]

Used to store the "word" of data.

The type "unsigned short" was chosen because in c++, shorts are 16bits (the same size as our words) and having it unsigned allows for easy "reading" as a positive int or a 2's complement int.

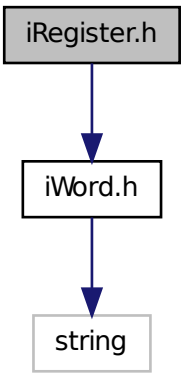
Chapter 8

File Documentation

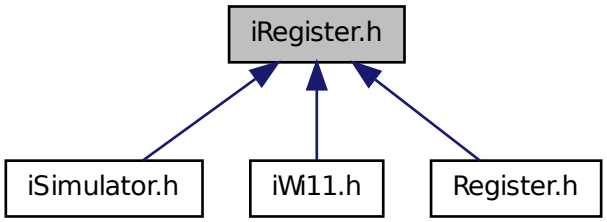
8.1 iRegister.h File Reference

Definition of a "register" in the Wi-11 machine.

Include dependency graph for iRegister.h:



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



Classes

- class iRegister

  Defines a "register" in the Wi-11 machine.

8.1.1 Detailed Description

Definition of a "register" in the Wi-11 machine.

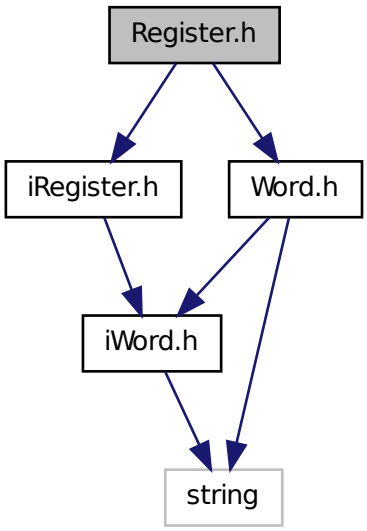
Author

Joshua Green
Andrew Groot

8.2 Register.h File Reference

Definition of private data for the "Register" class.

Include dependency graph for Register.h:



Classes

- class Register

8.2.1 Detailed Description

Definition of private data for the "Register" class.

Author

Andrew Groot

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