

Package ‘hexView’

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Title Viewing Binary Files

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Description Functions to view files in raw binary form like in a hex editor. Additional functions to specify and read arbitrary binary formats.

License GPL-2

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as.character.rawBlock *Convert Block of Binary Data into Strings*

Description

This function takes a "rawBlock" object and generates human-readable strings for displaying the block. Each string contains a binary offset, the binary data in a raw machine format, and an interpretation of the data in a human-readable format.

Usage

```
## S3 method for class 'rawBlock'  
as.character(x, width = NULL, machine = NULL,  
            sep1 = " : ", sep2 = " | ",  
            showOffset = TRUE, showHuman = TRUE, ...)
```

Arguments

| | |
|------------|---|
| x | A "rawBlock" object. |
| width | The number of bytes to display per string. |
| machine | The machine format to display; either "hex" or "binary". |
| sep1 | A separator to insert between the block offset and the machine format. |
| sep2 | A separator to insert between the machine format and the human-readable format. |
| showOffset | If FALSE, the column of offsets is not included in the strings. |
| showHuman | If FALSE, the column of human-readable format is not included in the strings. |
| ... | Other arguments to as.character. |

Details

If either width or machine is NULL, the relevant value is taken from the "rawBlock" object. The human-readable format is taken from the "rawBlock" object.

Value

A character vector.

Author(s)

Paul Murrell

See Also

[readRaw print.rawBlock](#)

Examples

```
fileBlock <- readRaw(hexViewFile("rawTest.txt"), width=8)
as.character(fileBlock)
```

```
as.character.rawFormat
```

Convert Binary File Format into Strings

Description

This function takes a "rawFormat" object and generates human-readable strings for displaying the format. Each string contains a binary offset, the binary data in a raw machine format, and an interpretation of the data in a human-readable format. The format consists of one or more sub-blocks and a heading line is added for each block.

Usage

```
## S3 method for class 'rawFormat'
as.character(x, sep1 = " : ", sep2 = " | ",
            blockHead = TRUE, blockChar = "=", ...)
```

Arguments

| | |
|-----------|--|
| x | A "rawFormat" object. |
| sep1 | A separator to insert between the format offset and the machine format. |
| sep2 | A separator to insert between the machine format and the human-readable format. |
| blockHead | A logical indicating whether to print a header between blocks of the format. |
| blockChar | The character used as a prefix to the block names for printing headers between blocks. |
| ... | Other arguments to as.character. |

Details

Information on the number of bytes on each line, the machine representation of each byte and the human-readable format are all taken from the taken from the "rawBlock" elements of the "rawFormat" object. Consequently each block can have a quite different appearance. Considerable effort is made to line up the separators across all blocks within the format.

Value

A character vector.

Author(s)

Paul Murrell

See Also

[readFormat](#) [print.rawFormat](#)

Examples

```
fileFormat <- readFormat(hexViewFile("rawTest.int"),
                        memFormat(int1=integer4, int2=integer4))
as.character(fileFormat)
```

atomicBlock

Create an atomicBlock Object

Description

This function creates an "atomicBlock" object, which is a description of a block of binary data. This can be used as part of a description of a binary format.

Usage

```
atomicBlock(type = "char", width = NULL, machine = "hex",
            size = switch(type, char = 1, int = 4, real = 8),
            endian = "little", signed = TRUE)
```

Arguments

| | |
|---------|--|
| type | How the block of binary data will be interpreted. either "char" (an ASCII character), "int" (an integer), or "real" (a floating point number). |
| width | The number of bytes to print per row when displaying the block. |
| machine | How to print each byte when displaying; either "hex" or "binary". |
| size | The number of bytes used to generate each value when interpreting the raw binary as character or numeric data. |
| endian | The endianness of the binary data; used when interpreting bytes as numeric values. |
| signed | Whether the bytes should be interpreted as a signed numeric value. |

Details

An "atomicBlock" object describes a binary block representing a single value.

Several standard binary types are predefined (with common C type equivalents in brackets): ASCIIchar (char), integer1 (signed char), integer2 (short), integer3, integer4 (int, long), integer8 (long long), real4 (float), real8 (double).

Value

An "atomicBlock" object.

Author(s)

Paul Murrell

See Also

[memFormat](#) [readFormat](#) [memBlock](#) [vectorBlock](#) [lengthBlock](#) [mixedBlock](#) [markedBlock](#)

Examples

```
# A C long
atomicBlock("int", size=4)
integer4
```

blockValue

Extract the Value of a Binary Block

Description

The blockValue function returns the interpreted value of a block of binary data (a "rawBlock" object).

The blockString function returns a null-terminated string from a block of binary data that is interpreted as a character data.

Usage

```
blockValue(block)
```

```
blockString(block)
```

Arguments

block A "rawBlock" object.

Details

The type of the value returned is determined when the binary block is created (e.g., by readRaw) *not* when the value is extracted by the blockValue function.

The blockString function is useful for extracting a value from a binary block which is a string padded with null characters.

The blockString function throws an error if the block is not interpreted as a character value.

Value

Either a character, or numeric vector depending on how the binary block should be interpreted.

Author(s)

Paul Murrell

See Also

[readRaw](#) [readFormat](#)

Examples

```
charBlock <- readRaw(hexViewFile("rawTest.txt"), width=8)
blockValue(charBlock)
blockString(charBlock)

intBlock <- readRaw(hexViewFile("rawTest.int"), human="int")
blockValue(intBlock)
```

hexViewFile

Specify an Example File

Description

This is just a convenience function for specifying one of the example files contained in the hexView package. It is used in examples in hexView help pages.

Usage

```
hexViewFile(filename)
```

Arguments

filename The name of the example file.

Value

The full path to the appropriate example file.

Author(s)

Paul Murrell

Examples

```
hexViewFile("rawTest.txt")
```

markedBlock *Create a markedBlock Object*

Description

This function creates a "markedBlock" object, which is a description of a block of binary data. This can be used as part of a description of a binary format.

Usage

```
markedBlock(marker=integer4,  
            switch=function(marker) { ASCIIchar },  
            markerLabel="marker", blockLabel="block")
```

Arguments

| | |
|-------------|--|
| marker | A "memBlock" object. |
| switch | A function that returns a "memBlock" object, or NULL. |
| markerLabel | A label to name the marker component of the "markedBlock" object. |
| blockLabel | A label to name the component that is read after the marker component of the "markedBlock" object. |

Details

A "markedBlock" object describes a block of binary data that consists of a "marker" block containing information on further blocks. The marker block is read first, then this block is passed to the switch function. The switch function can look at the contents of the marker block and decide what sort of block should be read next (the blockValue() function may be useful here). The result of the switch function is read from the end of the marker block. The marker block and the result of the switch function can be any type of "memBlock" object. If the result of the switch() function is NULL then only the marker block is returned (no further memory is read).

Value

A "markedBlock" object.

Author(s)

Paul Murrell

See Also

[memFormat](#) [readFormat](#) [memBlock](#) [atomicBlock](#) [vectorBlock](#) [lengthBlock](#) [mixedBlock](#) [blockValue](#)

Examples

```
# A single-byte integer which dictates how many
# subsequent four-byte reals to read
markedBlock(integer1,
            function(marker) {
                lengthBlock(real4, blockValue(marker))
            })
```

memBlock

Create a memBlock Object

Description

This function creates a "memBlock" object, which is a description of a block of binary data. This can be used as part of a description of a binary format.

Usage

```
memBlock(nbytes = 1, width = NULL, machine = "hex")
```

Arguments

| | |
|---------|---|
| nbytes | The number of bytes in the block. |
| width | The number of bytes to print per row when displaying the block. |
| machine | How to print each byte when displaying; either "hex" or "binary". |

Details

A binary block that is read in from a file using this description is interpreted as nbytes single-byte characters.

The description includes parameters controlling how a block of data should be displayed if this description is used to read in a block of binary data.

Value

A "memBlock" object.

Author(s)

Paul Murrell

See Also

[memFormat](#) [readFormat](#) [atomicBlock](#) [vectorBlock](#) [lengthBlock](#) [mixedBlock](#) [markedBlock](#)

Examples

```
memBlock(8)
```

`memFormat`*Create a memFormat Object*

Description

This function creates a "memFormat" object which is a description of a binary file format.

Usage

```
memFormat(...)
```

Arguments

... One or more "memBlock" objects.

Details

A "memFormat" object is made up of one or more "memBlock" objects.

Value

A "memFormat" object.

Author(s)

Paul Murrell

See Also

[readFormat](#) [memBlock](#) [atomicBlock](#) [vectorBlock](#) [lengthBlock](#) [mixedBlock](#) [markedBlock](#)

Examples

```
memFormat(int1=integer4, int2=integer4)
```

`mixedBlock`*Create a mixedBlock Object*

Description

This function creates a "mixedBlock" object, which is a description of a block of binary data. This can be used as part of a description of a binary format.

Usage

```
mixedBlock(...)
```

Arguments

... One or more "memBlock" objects.

Details

A "mixedBlock" object describes a block of binary data that consists of a series of sub-blocks. Each sub-block can be any type of "memBlock" object.

Value

A "mixedBlock" object.

Author(s)

Paul Murrell

See Also

[memFormat](#) [readFormat](#) [memBlock](#) [atomicBlock](#) [vectorBlock](#) [lengthBlock](#) [markedBlock](#)

Examples

```
# A line of text followed by a four-byte integer
mixedBlock(ASCIIline, integer4)
```

print.rawBlock

Print Method for Block of Binary Data

Description

This function displays a "rawBlock" object. Each line of output contains a binary offset, the binary data in a raw machine format, and an interpretation of the data in a human-readable format. The object contains parameters controlling the format of the display, some of which may be overridden in the call to print.

Usage

```
## S3 method for class 'rawBlock'
print(x, width = NULL, machine = NULL,
      sep1 = " : ", sep2 = " | ",
      showOffset = TRUE, showHuman = TRUE,
      page = FALSE, ...)
```

Arguments

| | |
|------------|--|
| x | A "rawBlock" object. |
| width | The number of bytes to display per line of output. |
| machine | The machine format to display; either "hex" or "binary". |
| sep1 | A separator to insert between the block offset and the machine format. |
| sep2 | A separator to insert between the machine format and the human-readable format. |
| showOffset | If FALSE, the column of offsets is not printed. |
| showHuman | If FALSE, the column of human-readable format is not printed. |
| page | If TRUE the output is sent to the file viewer specified by <code>getOption("pager")</code> . |
| ... | Other arguments to print. |

Details

If either width or machine is NULL, the relevant value is taken from the "rawBlock" object. The human-readable format is taken from the "rawBlock" object.

Author(s)

Paul Murrell

See Also

[readRaw as.character.rawBlock](#)

Examples

```
fileBlock <- readRaw(hexViewFile("rawTest.txt"))
print(fileBlock)
print(fileBlock, width=8)
print(fileBlock, machine="binary", width=4)
```

print.rawFormat

Print Method for Binary File Format

Description

This function displays a "rawFormat" object. Each line of output contains a binary offset, the binary data in a raw machine format, and an interpretation of the data in a human-readable format. The format consists of one or more sub-blocks and a heading line is added for each block. The object contains parameters controlling the format of the display, some of which may be overridden in the call to print.

Usage

```
## S3 method for class 'rawFormat'
print(x, sep1 = " : ", sep2 = " | ",
      blockHead = TRUE, blockChar = "=", page = FALSE, ...)
```

Arguments

| | |
|------------------------|--|
| <code>x</code> | A "rawFormat" object. |
| <code>sep1</code> | A separator to insert between the format offset and the machine format. |
| <code>sep2</code> | A separator to insert between the machine format and the human-readable format. |
| <code>blockHead</code> | A logical indicating whether to print a header between blocks of the format. |
| <code>blockChar</code> | The character used as a prefix to the block names for printing headers between blocks. |
| <code>page</code> | If TRUE the output is sent to the file viewer specified by <code>getOption("pager")</code> . |
| <code>...</code> | Other arguments to <code>print</code> . |

Details

Information on the number of bytes on each line, the machine representation of each byte and the human-readable format are all taken from the taken from the "rawBlock" elements of the "rawFormat" object. Consequently each block can have a quite different appearance. Considerable effort is made to line up the separators across all blocks within the format.

Author(s)

Paul Murrell

See Also

[readFormat as.character.rawFormat](#)

Examples

```
fileFormat <- readFormat(hexViewFile("rawTest.int"),
                        memFormat(int1=integer4, int2=integer4))
print(fileFormat)
print(fileFormat, sep2=":")
```

| | |
|------------|----------------------------|
| readEViews | <i>Read an Eviews File</i> |
|------------|----------------------------|

Description

This function reads a file in Eviews format (Eviews is an econometrics package).

Usage

```
readEViews(filename, time.stamp=TRUE, as.data.frame = TRUE)
```

Arguments

| | |
|---------------|--|
| filename | The name of the file. |
| time.stamp | A logical indicating whether to include a Date column in the result. |
| as.data.frame | If TRUE the result is a data frame; otherwise a list of variables is returned. |

Details

This function is just a demonstration of how the functions in this package can be used to read a complex binary format. It has been tested on a few sample files (and works), but there is no guarantee it will work for all Eviews files (this is not helped by the fact that it is based on reverse-engineering information about the Eviews format, NOT an official description of the format).

Value

Either a data frame or a list of variables.

Author(s)

Paul Murrell

References

<http://www.eviews.com/> and http://www.ecn.wfu.edu/~cottrell/eviews_format/

Examples

```
readEViews(hexViewFile("data4-1.wf1"))
```

 readFormat

Read a Binary File

Description

Read the raw binary content of a file using a description of the binary format.

Usage

```
readFormat(file, format, width = NULL, offset = 0, machine = "hex",
           flatten = TRUE)
```

Arguments

| | |
|---------|---|
| file | The name of a file or a connection. |
| format | A "memFormat" object. |
| width | The number of bytes to print per row when displaying the file. |
| offset | An offset within the file to start reading. |
| machine | How to print each byte when displaying the file; either "hex" or "binary". |
| flatten | If TRUE the list of blocks created from the "memFormat" description are flattened to a list of depth 1. |

Details

This function uses a "memFormat" description to read the raw binary content of a file and interpret sub-blocks of the file as distinct (blocks of) values.

The "memFormat" can describe a nested structure of blocks. The `flatten` argument is used to convert nested format structures to a flat (depth of one) structure.

The format is always flattened for display, but extracting

Value

A "rawFormat" object, which is a list:

| | |
|--------|---|
| blocks | A list (of lists) of "rawBlock" objects. |
| offset | The offset in the file where reading began. |
| nbytes | The number of bytes read from the file. |

Author(s)

Paul Murrell

See Also

[viewFormat](#) [memFormat](#) [as.character.rawFormat](#) [print.rawFormat](#) [readRaw](#) [readBin](#)

Examples

```
fileFormat <- readFormat(hexViewFile("rawTest.int"),
                        memFormat(int1=integer4, int2=integer4))
blockValue(fileFormat$blocks$int2)

fileFormat <- readFormat(hexViewFile("rawTest.int"),
                        memFormat(integers=vectorBlock(integer4, 20)))
blockValue(fileFormat$blocks$integers)
```

readRaw

*Read the Raw Binary Content of a File***Description**

Read the contents of a file as bytes and create an object containing the raw data, plus optionally an interpretation of the bytes as numeric values, plus parameters controlling how to display the data.

Usage

```
readRaw(file, width = NULL, offset = 0, nbytes = NULL,
        machine = "hex", human = "char",
        size = switch(human, char = 1, int = 4, real = 8),
        endian = .Platform$endian, signed = TRUE)
```

Arguments

| | |
|---------|--|
| file | The name of a file or a connection. |
| width | The number of bytes to print per row when displaying the data. |
| offset | An offset within the file to start reading. |
| nbytes | The number of bytes to read from the file. NULL means read the whole file. |
| machine | How to print each byte when displaying; either "hex" or "binary". |
| human | How to print a human-readable form of the data; either "char" (an ASCII character), "int" (an integer), or "real" (a floating point number). |
| size | The number of bytes used to generate each value when interpreting the raw binary as character or numeric data. |
| endian | The endianness of the binary data; used when interpreting bytes as numeric values. |
| signed | Whether the bytes should be interpreted as a signed numeric value. |

Details

Each individual byte is printed in the appropriate machine format, but there is only one value printed in the appropriate human format for every size bytes. Consequently, the width must be a multiple of the size.

Value

An object of class "rawBlock".

Author(s)

Paul Murrell

See Also

[viewRaw](#) [readBin](#) [as.character](#) [rawBlock](#) [print.rawBlock](#) [blockValue](#) [readFormat](#)

Examples

```
readLines(hexViewFile("rawTest.txt"))

fileBlock <- readRaw(hexViewFile("rawTest.txt"), width=8)
blockValue(fileBlock)

fileBlock <- readRaw(hexViewFile("rawTest.int"), human="int")
blockValue(fileBlock)
```

vectorBlock

Create a vectorBlock Object

Description

These functions create a "vectorBlock" or lengthBlock object, which are a descriptions of a block of binary data. These can be used as part of a description of a binary format.

Usage

```
vectorBlock(block = ASCIIchar, length = 1)
lengthBlock(length = integer4, block = ASCIIchar, blockLabel = "block")
```

Arguments

| | |
|------------|---|
| block | An object derived from the "memBlock" class, e.g., an "atomicBlock" object. |
| length | The number of block objects in the overall binary block. |
| blockLabel | A label to name the block component of the "lengthBlock" object. |

Details

These objects describe a block of binary data that consists of a repeating sub-block. The sub-block can be any type of "memBlock" object.

There is also a predefined ASCIIline block, which is a block of single-byte characters terminated by a newline character.

Value

A "vectorBlock" or lengthBlock object.

Author(s)

Paul Murrell

See Also

[memFormat](#) [readFormat](#) [memBlock](#) [atomicBlock](#) [mixedBlock](#) [markedBlock](#)

Examples

```
# A block of 20 four-byte blocks
# which are interpreted as integer values
vectorBlock(integer4, 20)
```

viewFormat

View a Binary File

Description

Displays the raw bytes of a file like a hex editor, showing offsets within the file, raw bytes in binary or hexadecimal form, and a human-readable representation of the bytes as either ASCII characters, integers, or real values. The file is broken up into blocks according to a supplied file format specification.

Usage

```
viewFormat(..., page = FALSE)
```

Arguments

| | |
|------|--|
| ... | Arguments passed to the function <code>readFormat</code> , most importantly, a "memFormat" describing the file format. |
| page | If TRUE, the output is sent to the application set up to display text files as per <code>getOption("pager")</code> . |

Details

This function is only called for its side-effect, which is to display the file.

Author(s)

Paul Murrell

See Also[readFormat viewRaw](#)**Examples**

```
viewFormat(hexViewFile("rawTest.int"),
            memFormat(int1=integer4, int2=integer4))
viewFormat(hexViewFile("rawTest.int"),
            memFormat(integers=vectorBlock(integer4, 20)))
```

`viewRaw`*View the Raw Binary Content of a File*

Description

Displays the raw bytes of a file like a hex editor, showing offsets within the file, raw bytes in binary or hexadecimal form, and a human-readable representation of the bytes as either ASCII characters, integers, or real values.

Usage

```
viewRaw(..., page = FALSE)
```

Arguments

| | |
|-------------------|--|
| <code>...</code> | Arguments passed to the function <code>readRaw</code> . |
| <code>page</code> | If TRUE, the output is sent to the application set up to display text files as per <code>getOption("pager")</code> . |

Details

This function is only called for its side-effect, which is to display the file.

Author(s)

Paul Murrell

See Also[readRaw viewFormat](#)

Examples

```
viewRaw(hexViewFile("rawTest.txt"), width=8)
viewRaw(hexViewFile("rawTest.txt"), machine="binary", width=4)

# UNICODE text
# rawTest.unicode created using Notepad on Windows
viewRaw(hexViewFile("rawTest.unicode"), width=8)

viewRaw(hexViewFile("rawTest.int"), human="int")
viewRaw(hexViewFile("rawTest.real"), human="real", width=8, endian="big")
```

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