Documentation

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3 – Using the mxmldoc Utility

This chapter describes how to use the `mxmldoc(1)` utility that comes with Mini–XML to automatically generate documentation for your programs.

A – GNU Library General Public License

Version 2, June 1991

59 Temple Place – Suite 330, Boston, MA 02111–1307, USA

[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

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B – Release Notes

Changes in Mini–XML 2.0

- Changed the whitespace callback interface to return strings instead of a single character, allowing for greater control over the formatting of XML files written using Mini–XML. THIS CHANGE WILL REQUIRE CHANGES TO YOUR CODE IF YOU USE WHITESPACE CALLBACKS.
- The mxmldoc utility is now capable of documenting C++ classes, functions, and structures, and correctly handles C++ comments.
- Added new modular tests for mxmldoc.
- Updated the mxmldoc output to be more compatible with embedding in manuals produced with HTMLDOC.
- The makefile incorrectly included a "/" separator between the destination path and install path. This caused problems when building and installing with MingW.

Changes in Mini–XML 1.3

- Fixes for mxmldoc.
- Added support for reading standard HTML entity names.
- mxmlLoadString/File() did not decode character entities in element names, attribute names, or attribute values.
- mxmlLoadString/File() would crash when loading non– conformant XML data under an existing parent (top) node.
- Fixed several bugs in the mxmldoc utility.

- Added new error callback function to catch a variety of errors and log them to someplace other than stderr.
- The mxmlElementSetAttr() function now allows for NULL attribute values.
- The load and save functions now properly handle quoted element and attribute name strings properly, e.g. for !DOCTYPE declarations.

Changes in Mini–XML 1.2

- Added new "set" methods to set the value of a node.
- Added new formatted text methods mxmlNewTextf() and mxmlSetTextf() to create/set a text node value using printf–style formats.
- Added new standard callbacks for use with the mxmlLoad functions.
- Updated the HTML documentation to include examples of the walk and load function output.
- Added ––with/without–ansi configure option to control the strdup() function check.
- Added ––with/without–snprintf configure option to control the snprintf() and vsnprintf() function checks.

Changes in Mini–XML 1.1.2

- The mxml(3) man page wasn't updated for the string functions.
- mxmlSaveString() returned the wrong number of characters.
- mxml_add_char() updated the buffer pointer in the wrong place.

Changes in Mini–XML 1.1.1

- The private mxml_add_ch() function did not update the start–of–buffer pointer which could cause a crash when using mxmlSaveString().
- The private mxml_write_ws() function called putc() instead of using the proper callback which could cause a crash when using mxmlSaveString().
- Added a mxmlSaveAllocString() convenience function for saving an XML node tree to an allocated string.

Changes in Mini–XML 1.1

- The mxmlLoadFile() function now uses dynamically allocated string buffers for element names, attribute names, and attribute values. Previously they were capped at 16383, 255, and 255 bytes, respectively.
- Added a new mxmlLoadString() function for loading an XML node tree from a string.
- Added a new mxmlSaveString() function for saving an XML node tree to a string.
- Add emulation of strdup() if the local platform does not provide the function.

Changes in Mini–XML 1.0

- The mxmldoc program now handles function arguments, structures, unions, enumerations, classes, and typedefs properly.
- Documentation provided via mxmldoc and more in–line comments in the code.
- Added man pages and packaging files.

Changes in Mini–XML 0.93

- New mxmldoc example program that is also used to create and update code documentation using XML and produce HTML reference pages.
- Added mxmlAdd() and mxmlRemove() functions to add and remove nodes from a tree. This provides more flexibility over where the nodes are inserted and allows nodes to be moved within the tree as needed.
- mxmlLoadFile() now correctly handles comments.
- mxmlLoadFile() now supports the required "gt", "quot", and "nbsp" character entities.
- mxmlSaveFile() now uses newlines as whitespace when valid to do so.
- mxmlFindElement() now also takes attribute name and attribute value string arguments to limit the search to specific elements with attributes and/or values.

  NULL pointers can be used as "wildcards".
- Added uninstall target to makefile, and auto–reconfig if Makefile.in or configure.in are changed.
- mxmlFindElement(), mxmlWalkNext(), and mxmlWalkPrev() now all provide "descend" arguments to control whether they descend into child nodes in the tree.
- Fixed some whitespace issues in mxmlLoadFile().
- Fixed Unicode output and whitespace issues in mxmlSaveFile().
- mxmlSaveFile() now supports a whitespace callback to provide more human–readable XML output under program control.

Changes in Mini–XML 0.92

- mxmlSaveFile() didn't return a value on success.

Changes in Mini–XML 0.91

- mxmlWalkNext() would go into an infinite loop.

Changes in Mini–XML 0.9

- Initial public release.

C – Library Reference

Contents

Enumerations

- mxml_type_e

mxml_type_e

Description

The XML node type.

Values

Name	Description
MXML_ELEMENT	XML element with attributes
MXML_INTEGER	Integer value
MXML_OPAQUE	Opaque string
MXML_REAL	Real value
MXML_TEXT	Text fragment

Functions

mxmlAdd()

Description

Add a node to a tree. Adds the specified node to the parent. If the child argument is not NULL, puts the new node before or after the specified child depending on the value of the where argument. If the child argument is NULL, puts the new node at the beginning of the child list (MXML_ADD_BEFORE) or at the end of the child list (MXML_ADD_AFTER). The constant MXML_ADD_TO_PARENT can be used to specify a NULL child pointer.

Syntax

```
void
mxmlAdd(
    mxml_node_t * parent,
    int where,
    mxml_node_t * child,
    mxml_node_t * node);
```

Arguments

Name	Description
parent	Parent node
where	Where to add, MXML_ADD_BEFORE or MXML_ADD_AFTER
child	Child node for where or MXML_ADD_TO_PARENT
node	Node to add

Returns

Nothing.

mxmlDelete()

Description

Delete a node and all of its children. If the specified node has a parent, this function first removes the node from its parent using the mxmlRemove() function.

Syntax

```
void
mxmlDelete(
    mxml_node_t * node);
```

Arguments

Name	Description
node	Node to delete

Returns

Nothing.

mxmlElementGetAttr()

Description

Get an attribute. This function returns NULL if the node is not an element or the named attribute does not exist.

Syntax

```
const char *
mxmlElementGetAttr(
    mxml_node_t * node,
    const char * name);
```

Arguments

Name	Description
node	Element node
name	Name of attribute

Returns

Attribute value or NULL

mxmlElementSetAttr()

Description

Set an attribute. If the named attribute already exists, the value of the attribute is replaced by the new string value. The string value is copied into the element node. This function does nothing if the node is not an element.

Syntax

```
void
mxmlElementSetAttr(
    mxml_node_t * node,
    const char * name,
    const char * value);
```

Arguments

Name	Description
node	Element node
name	Name of attribute
value	Attribute value

Returns

Nothing.

mxmlEntityGetName()

Description

Get the name that corresponds to the character value. If val does not need to be represented by a named entity, NULL is returned.

Syntax

```
const char *
mxmlEntityGetName(
    int val);
```

Arguments

Name	Description
val	Character value

Returns

Entity name or NULL

mxmlEntityGetValue()

Description

Get the character corresponding to a named entity. The entity name can also be a numeric constant. −1 is returned if the name is not known.

Syntax

```
int
mxmlEntityGetValue(
    const char * name);
```

Arguments

Name	Description
name	Entity name

Returns

Character value or −1 on error

mxmlFindElement()

Description

Find the named element. The search is constrained by the name, attribute name, and value; any NULL names or values are treated as wildcards, so different kinds of searches can be implemented by looking for all elements of a given name or all elements with a specific attribute. The descend argument determines whether the search descends into child nodes; normally you will use MXML_DESCEND_FIRST for the initial search and MXML_NO_DESCEND to find additional direct descendents of the node. The top node argument constrains the search to a particular node's children.

Syntax

```
mxml_node_t *
mxmlFindElement(
    mxml_node_t * node,
    mxml_node_t * top,
    const char * name,
    const char * attr,
    const char * value,
    int descend);
```

Arguments

Name	Description
node	Current node
top	Top node
name	Element name or NULL for any
attr	Attribute name, or NULL for none
value	Attribute value, or NULL for any
descend	Descend into tree – MXML_DESCEND, MXML_NO_DESCEND, or MXML_DESCEND_FIRST

Returns

Element node or NULL

mxmlLoadFile()

Description

Load a file into an XML node tree. The nodes in the specified file are added to the specified top node. If no top node is provided, the XML file MUST be well−formed with a single parent node like <?xml> for the entire file. The callback function returns the value type that should be used for child nodes. If MXML_NO_CALLBACK is specified then all child nodes will be either MXML_ELEMENT or MXML_TEXT nodes. The constants MXML_INTEGER_CALLBACK, MXML_OPAQUE_CALLBACK, MXML_REAL_CALLBACK, and MXML_TEXT_CALLBACK are defined for loading child nodes of the specified type.

Syntax

```
mxml_node_t *
mxmlLoadFile(
    mxml_node_t * top,
    FILE * fp,
    mxml_type_t (*cb)(mxml_node_t *node));
```

Arguments

Name	Description
top	Top node
fp	File to read from
(*cb)(mxml_node_t *node)	Callback function or MXML_NO_CALLBACK

Returns

First node or NULL if the file could not be read.

mxmlLoadString()

Description

Load a string into an XML node tree. The nodes in the specified string are added to the specified top node. If no top node is provided, the XML string MUST be well−formed with a single parent node like <?xml> for the entire string. The callback function returns the value type that should be used for child nodes. If MXML_NO_CALLBACK is specified then all child nodes will be either MXML_ELEMENT or MXML_TEXT nodes. The constants MXML_INTEGER_CALLBACK, MXML_OPAQUE_CALLBACK, MXML_REAL_CALLBACK, and MXML_TEXT_CALLBACK are defined for loading child nodes of the specified type.

Syntax

```
mxml_node_t *
mxmlLoadString(
    mxml_node_t * top,
    const char * s,
    mxml_type_t (*cb)(mxml_node_t *node));
```

Arguments

Name	Description
top	Top node
s	String to load
(*cb)(mxml_node_t *node)	Callback function or MXML_NO_CALLBACK

Returns

First node or NULL if the string has errors.

mxmlNewElement()

Description

Create a new element node. The new element node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new element node has no parent.

Syntax

```
mxml_node_t *
mxmlNewElement(
    mxml_node_t * parent,
    const char * name);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
name	Name of element

Returns

New node

mxmlNewInteger()

Description

Create a new integer node. The new integer node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new integer node has no parent.

Syntax

```
mxml_node_t *
mxmlNewInteger(
    mxml_node_t * parent,
    int integer);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
integer	Integer value

Returns

New node

mxmlNewOpaque()

Description

Create a new opaque string. The new opaque node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new opaque node has no parent. The opaque string must be nul−terminated and is copied into the new node.

Syntax

```
mxml_node_t *
mxmlNewOpaque(
    mxml_node_t * parent,
    const char * opaque);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
opaque	Opaque string

Returns

New node

mxmlNewReal()

Description

Create a new real number node. The new real number node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new real number node has no parent.

Syntax

```
mxml_node_t *
mxmlNewReal(
    mxml_node_t * parent,
    double real);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
real	Real number value

Returns

New node

mxmlNewText()

Description

Create a new text fragment node. The new text node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new text node has no parent. The whitespace parameter is used to specify whether leading whitespace is present before the node. The text string must be nul−terminated and is copied into the new node.

Syntax

```
mxml_node_t *
mxmlNewText(
    mxml_node_t * parent,
    int whitespace,
    const char * string);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
whitespace	1 = leading whitespace, 0 = no whitespace
string	String

Returns

New node

mxmlNewTextf()

Description

Create a new formatted text fragment node. The new text node is added to the end of the specified parent's child list. The constant MXML_NO_PARENT can be used to specify that the new text node has no parent. The whitespace parameter is used to specify whether leading whitespace is present before the node. The format string must be nul−terminated and is formatted into the new node.

Syntax

```
mxml_node_t *
mxmlNewTextf(
    mxml_node_t * parent,
    int whitespace,
    const char * format,
    ...);
```

Arguments

Name	Description
parent	Parent node or MXML_NO_PARENT
whitespace	1 = leading whitespace, 0 = no whitespace
format	Printf−style frmat string
...	Additional args as needed

Returns

New node

mxmlRemove()

Description

Remove a node from its parent. Does not free memory used by the node – use mxmlDelete() for that. This function does nothing if the node has no parent.

Syntax

```
void
mxmlRemove(
    mxml_node_t * node);
```

Arguments

Name	Description
node	Node to remove

Returns

Nothing.

mxmlSaveAllocString()

Description

Save an XML node tree to an allocated string. This function returns a pointer to a string containing the textual representation of the XML node tree. The string should be freed using the free() function when you are done with it. NULL is returned if the node would produce an empty string or if the string cannot be allocated.

Syntax

```
char *
mxmlSaveAllocString(
    mxml_node_t * node,
    const char * (*cb)(mxml_node_t *node, int ws));
```

Arguments

Name	Description
node	Node to write
(*cb)(mxml_node_t *node, int ws)	Whitespace callback or MXML_NO_CALLBACK

Returns

Allocated string or NULL

mxmlSaveFile()

Description

Save an XML tree to a file. The callback argument specifies a function that returns a whitespace character or nul (0) before and after each element. If MXML_NO_CALLBACK is specified, whitespace will only be added before MXML_TEXT nodes with leading whitespace and before attribute names inside opening element tags.

Syntax

```
int
mxmlSaveFile(
    mxml_node_t * node,
    FILE * fp,
    const char * (*cb)(mxml_node_t *node, int ws));
```

Arguments

Name	Description
node	Node to write
fp	File to write to
(*cb)(mxml_node_t *node, int ws)	Whitespace callback or MXML_NO_CALLBACK

Returns

0 on success, −1 on error.

mxmlSaveString()

Description

Save an XML node tree to a string. This function returns the total number of bytes that would be required for the string but only copies (bufsize – 1) characters into the specified buffer.

Syntax

```
int
mxmlSaveString(
    mxml_node_t * node,
    char * buffer,
    int bufsize,
    const char * (*cb)(mxml_node_t *node, int ws));
```

Arguments

Name	Description
node	Node to write
buffer	String buffer
bufsize	Size of string buffer
(*cb)(mxml_node_t *node, int ws)	Whitespace callback or MXML_NO_CALLBACK

Returns

Size of string

mxmlSetElement()

Description

Set the name of an element node. The node is not changed if it is not an element node.

Syntax

```
int
mxmlSetElement(
    mxml_node_t * node,
    const char * name);
```

Arguments

Name	Description
node	Node to set
name	New name string

Returns

0 on success, −1 on failure

mxmlSetErrorCallback()

Description

Set the error message callback.

Syntax

```
void
mxmlSetErrorCallback(
    void (*cb)(const char *));
```

Arguments

Name	Description
`(*cb)(const char *)`	Error callback function

Returns

Nothing.

mxmlSetInteger()

Description

Set the value of an integer node. The node is not changed if it is not an integer node.

Syntax

```
int
mxmlSetInteger(
    mxml_node_t * node,
    int integer);
```

Arguments

Name	Description
node	Node to set
integer	Integer value

Returns

0 on success, −1 on failure

mxmlSetOpaque()

Description

Set the value of an opaque node. The node is not changed if it is not an opaque node.

Syntax

```
int
mxmlSetOpaque(
    mxml_node_t * node,
    const char * opaque);
```

Arguments

Name	Description
node	Node to set
opaque	Opaque string

Returns

0 on success, −1 on failure

mxmlSetReal()

Description

Set the value of a real number node. The node is not changed if it is not a real number node.

Syntax

```
int
mxmlSetReal(
    mxml_node_t * node,
    double real);
```

Arguments

Name	Description
node	Node to set
real	Real number value

Returns

0 on success, −1 on failure

mxmlSetText()

Description

Set the value of a text node. The node is not changed if it is not a text node.

Syntax

```
int
mxmlSetText(
    mxml_node_t * node,
    int whitespace,
    const char * string);
```

Arguments

Name	Description
node	Node to set
whitespace	1 = leading whitespace, 0 = no whitespace
string	String

Returns

0 on success, −1 on failure

mxmlSetTextf()

Description

Set the value of a text node to a formatted string. The node is not changed if it is not a text node.

Syntax

```
int
mxmlSetTextf(
    mxml_node_t * node,
    int whitespace,
    const char * format,
    ...);
```

Arguments

Name	Description
node	Node to set
whitespace	1 = leading whitespace, 0 = no whitespace
format	Printf−style format string
...	Additional arguments as needed

Returns

0 on success, −1 on failure

mxmlWalkNext()

Description

Walk to the next logical node in the tree. The descend argument controls whether the first child is considered to be the next node. The top node argument constrains the walk to the node's children.

Syntax

```
mxml_node_t *
mxmlWalkNext(
    mxml_node_t * node,
    mxml_node_t * top,
    int descend);
```

Arguments

Name	Description
node	Current node
top	Top node
descend	Descend into tree – MXML_DESCEND, MXML_NO_DESCEND, or MXML_DESCEND_FIRST

Returns

Next node or NULL

mxmlWalkPrev()

Description

Walk to the previous logical node in the tree. The descend argument controls whether the previous node's last child is considered to be the previous node. The top node argument constrains the walk to the node's children.

Syntax

```
mxml_node_t *
mxmlWalkPrev(
    mxml_node_t * node,
    mxml_node_t * top,
    int descend);
```

Arguments

Name	Description
node	Current node
top	Top node
descend	Descend into tree – MXML_DESCEND, MXML_NO_DESCEND, or MXML_DESCEND_FIRST

Returns

Previous node or NULL

Structures

- mxml_attr_s
- mxml_node_s
- mxml_text_s
- mxml_value_s

mxml_attr_s

Description

An XML element attribute value.

Definition

```
struct mxml_attr_s
{
  char * name;
  char * value;
};
```

Members

Name	Description
name	Attribute name
value	Attribute value

mxml_node_s

Description

An XML node.

Definition

```
struct mxml_node_s
{
  struct mxml_node_s * child;
  struct mxml_node_s * last_child;
  struct mxml_node_s * next;
  struct mxml_node_s * parent;
  struct mxml_node_s * prev;
  mxml_type_t type;
  mxml_value_t value;
};
```

Members

Name	Description
child	First child node
last_child	Last child node
next	Next node under same parent
parent	Parent node
prev	Previous node under same parent
type	Node type
value	Node value

mxml_text_s

Description

An XML text value.

Definition

```
struct mxml_text_s
{
  char * string;
  int whitespace;
};
```

Members

Name	Description
string	Fragment string
whitespace	Leading whitespace?

mxml_value_s

Description

An XML element value.

Definition

```
struct mxml_value_s
{
  mxml_attr_t * attrs;
  char * name;
  int num_attrs;
};
```

Members

Name	Description
attrs	Attributes
name	Name of element
num_attrs	Number of attributes

Types

- mxml_attr_t
- mxml_element_t
- mxml_node_t
- mxml_text_t
- mxml_type_t
- mxml_value_t

mxml_attr_t

Description

An XML element attribute value.

Definition

```
typedef struct mxml_attr_s mxml_attr_t;
```

mxml_element_t

Description

An XML element value.

Definition

```
typedef struct mxml_value_s mxml_element_t;
```

mxml_node_t

Description

An XML node.

Definition

```
typedef struct mxml_node_s mxml_node_t;
```

mxml_text_t

Description

An XML text value.

Definition

```
typedef struct mxml_text_s mxml_text_t;
```

mxml_type_t

Description

The XML node type.

Definition

```
typedef enum mxml_type_e mxml_type_t;
```

mxml_value_t

Description

An XML node value.

Definition

```
typedef union mxml_value_u mxml_value_t;
```

Unions

- mxml_value_u

mxml_value_u

Description

An XML node value.

Definition

```
union mxml_value_u
{
  mxml_element_t element;
  int integer;
  char * opaque;
  double real;
  mxml_text_t text;
};
```

Members

Name	Description
element	Element
integer	Integer number
opaque	Opaque string
real	Real number
text	Text fragment