Welcome to libjson 7. libjson is the fastest and more customizable json library for C and C++. It has a special interface for C++, to allow C++ programmers to embed libjson within their program, and because many of libjson's functions are inlined, they will get a major optimization boost from the compiler.

It also has a C-style interface for other programming languages and for sharing libraries. This document will explain building and optimizing libjson to fit your needs, the C interface, and the C++ specialized interface. Each has their own part in this document.

If you are upgrading from libJSON 5 or earlier, this new library has a different interface, so your programs will break if you try and plug and play, but it should not be difficult to convert them, as all of the functions are still there, they just have more standardized names.

If you are upgrading from libjson 6, the only difference in the interface in json_validate.

libjson's interface will not change during minor or bug fix releases. Only major upgrades will (ie, libjson 6 to libjson 7.)

You should look at the changelog at the end of the document each time you upgrade, as things may have been added or fixed that you are using.

About libjson

libjson is a high speed complete JSON library, including parsers, writers, builders, formatters, validators… It is also highly customizable. It may seem strange that libjson is considered a very lightweight library, but the documentation is 200 pages long and there are dozens of source files, but the fact is that very little of the library gets complied at any given time. The JSONOptions.h file sets options for which parts are compiled and how they are. This document will tell you if function behave differently or are unavailable under certain options.

libjson was written with performance in mind. It is fast, and uses very little memory. Low level memory manipulation allows libjson to do some speed tricks that less fine-tuned libraries don't do. The loads of preprocessor options means that there are few conditions at run-time, allowing it to focus as much energy on the task at hand. The options allow you to optimize libjson for your program. See the Optimizing libjson section near the end of this document.

I also gave it more customizability than any other library, including mutex managers, garbage collection, memory control, and unicode support, all optional of course, and not on by default. There is a clean C interface, with all methods using C - style names and all prefixed with json_. There is also a very intuitive C++ interface complete with iterators, and a very STL - style interface. These two libraries share some code, but also have version specific code.

libjson is also quiet secure, it is immune from most DoS attacks with it's default options on and its security options are all configurable.

Please report any bugs or feature requests here: http://sourceforge.net/tracker/?group_id=314112

If you email from your sourceforge account, be sure that you're able to receive replies. It seems that the default behavior of sourceforge turns this off, I've gotten lots of requests for help that I've been unable to respond to, I try my best to find another way to answer you, but I can't always.

C interface   55

C++ interface   135

Supported platforms

libjson officially supports and has been tested on the following platforms

gcc (OSX) - Fully
llvm (OSX) - Fully
gcc (LInux) - Fully
MinGW (Windows) - Supported, partially tested
Visual C++ (Windows) - Supported, partially tested

More compilers are being added as I get word that it is working on them. If you are using a different compiler than one on this list, it *should* would. The code is meant to be platform and compiler independent. If there are minor incompatibilities, please open a ticket on sourceforge and I will get it fixed as soon as I can.

Building libjson

libjson is designed for customizability by experts, but also ease of use by novices. Most users simply need to make the library. If you are planning on embedding it in your C++ program, then all you have to do is add libjson's source to your project and comment JSON_LIBRARY in JSONOptions.h. libjson does not use anything other than built-in C++ and any compiler should compile it.

JSONOptions.h

In the source code you will find a file called JSONOptions.h, which is used for configuring libjson's build. All of the options are in there and it's recommended that you leave them, just comment out what you don't need. There is a brief description of each option in the file, as well as a more extensive explanation further down in this document.

I chose to use a file for the options in libjson instead of forcing the user to know compile options and change them in the project and make files. I think this is easier.

It is recommended that you build and run the Unit Test before compiling for the library or using it in C++. As there are billions of combinations of options, not all of them have been tested together. If the build failed, please take out a ticket on sourceforge: http://sourceforge.net/tracker/?group_id=314112 or email the author at ninja9578@yahoo.com. Your issue will be quickly fixed and your options added to the quarter of a million unit tests that are already run, that way regression of the bug is impossible.

Make Options

Thanks to Bernhard Fluehmann, libjson now has a proper makefile. The options of how libjson behaves are all in JSONOptions, but the way it compiles depends on the options you give the make file. The most common options for the makefile are BUILD_TYPE, SHARED, and install.

Running make by itself will cause the library to be built as a static library, exactly where the source is. Doing make install will install it in the exec_prefix. By default, exec_prefix is /usr/local, but you can set this as an option too.

To build libjson for specific purposes, you can set the BUILD_TYPE parameter. This is set to the same values as libjson 6's target: small or debug;

	BUILD_TYPE=debug	BUILD_TYPE=small
Output	libjson_dbg.a	libjson.a
Library Options	JSONOptions.h, and JSON_DEBUG	JSONOptions.h and JSON_LESS_MEMORY
Compile Options	-g -Wall	-Os, -ffast-math -DNDEBUG

libjson now also has an option to compile as a shared or static library. Shared libraries are quite useful if you have multiple programs that all require json functionality. To use a shared library make SHARED=1. By default, SHARED is 0, so it will output a static library. The extension for a shared library is hard coded as .so in the makefile. To use .dll or .dylib, you will have to edit the make file. There are a few more options, all documented in the makefile itself.

JSON_LIBRARY

This option exposes only the C-style interface, which is used for static and dynamic library compilation so that it can be shared by multiple programs, or used by non-C++ programming languages. This C interface is a little simpler so that it is compatible with most programming languages primitives, but the overall functionality remains the same.

Recommended for

Sharing the library among multiple programs, dynamically loading the library, or using it in a programming language other than C++.

On by default

Yes

JSON_STRICT

This option makes libjson strictly adhere to the specs laid out for JSON. This eliminates all support for comments, hexadecimal and octal values, and various other things that libjson supports that isn't standard.

Recommended for

Programmers who want a bare-bones strict JSON library and nothing more.

Requirements

JSON_UNICODE is required for this option
JSON_COMMENTS is required to be off for this option
JSON_OCTAL is required to be off for this option

On by default

No

JSON_DEBUG

This option is used to create a debugging version of the library. It does a lot of checks not only of the json, but also of the library itself. This is recommended only while writing your software, but not for release, as it is a little bit slower.

This option exposes libjson::registerDebugCallback in C++ and json_register_debug_callback in C, which allows you to get feedback from libjson if something goes wrong. This will not protect against errors, only let you know about them before it crashes. If you want to catch errors and handle them gracefully, then turn on JSON_SAFE as well. You can also turn on JSON_STDERROR, which hides the callbacks and prints problems to stderr.

This option also exposes the JSONNode::dump function in C++, which allows you inspect the internal workings of libjson, which can be useful for debugging. I chose to omit this from the C interface because it is mostly used by the author and maintainers.

Recommended for

Writing and debugging software, not for release software

On by default

No

JSON_ISO_STRICT

This option makes libjson use iso strict settings. This includes doing things like removing any non-standard C++ functionality like long longs and wchar_t.

Recommended for

Those who have compiler or company restrictions

On by default

Depends, usually it is off, but if you compile on GCC with -ansi, this option will turn itself on and warn you that you left it off

JSON_SAFE

This option is also used for debugging, but can also be useful if you think that your program might receive json that is not properly formatted. If libjson encounters something it it considers an error, then it will tell you through the callback or stderr, depending on the other options. then handle it gracefully. This option is required for validation.

Recommended for

Programs that might receive incorrect json, or if you need to validate json. If your sure that your json will be correct, then there is no need for this option.

On by default

Yes

JSON_CASTABLE

This option creates implicit casts between internal types. For example, if you call as_int on a bool, with this option turned on, it will return 1 if true, and 0 if false. If this option is not on, this behavior is undefined. This makes libjson more flexible, but also makes the binary larger.

Recommended for

Those who want a flexible and weakly typed libjson

On by default

Yes

JSON_STDERROR

        This option is will route all error messages to cerr instead of the callback. It hides libjson::registerDebugCallback and json_register_debug_callback as they are not needed. You can see the errors in the console.

Recommended for

        Debugging for those who do not want to handle error messages in a special way.

On by default

        No

JSON_PREPARSE

This option forces libjson to parse the entire json string at once. By default, libjson does on-the-fly parsing for speed reasons. This makes initial parsing much faster and use much less memory, but subsequent reads of it slightly slower. This options switches those.

Recommended for

Programs that use all or most of the json that it receives. Because json is largely used for communication from client to server, often the server will send more information that needed, so parsing all of it wastes time for no reason. However, json can also be used for configuration files as well as other things, so in cases like that, it might be preferable to use this option.

On by default

No

JSON_LESS_MEMORY

This option makes libjson use about 20% less memory on average. When libjson is done using memory, it doesn't always release all of it, it keeps it allocated so that any future requests to push memory back is much faster. This option doesn't allow that to happen, it instantly releases all extra memory.
This also turns off hot spot optimizations under GCC, but turns on the better packing.

Recommended for

Programs that need as much memory as possible. Possibly for embedded programming, or programs that might end up using billions of nodes and need as much memory as possible.

On by default

No

JSON_UNICODE

This option makes libjson use wide strings both internally and for the interface. Because the JSON standard specifies that it must support full UTF8, libjson can not meet this standard without wide characters. However, because these multi-byte characters are rarely used, this is optional, and off by default.

Recommended for

Programs that need the full range of UTF-8.

Requirements

Must not be compiled using ansi strict.

On by default

No

JSON_REF_COUNT

This option makes libjson's nodes reference count and copy-on-write it's internal structure. This makes passing by value and copying nodes very fast, but less thread-safe.

Recommended for

Programmers that want to copy and pass by value often. Also by programmers who take JSONNodes just to read them. It is recommended if you are interacting with your json with multiple threads, that you turn this option off, or use the JSON_MUTEX_CALLBACKs options and use critical sections.

On by default

Yes

JSON_BINARY

This option turns on the set_binary and get_binary functions. Because the JSON standard offers no way to encode true binary data, libjson (like most json libraries) uses Base64 to encode and decode binary data into text. This allows you to transport binary data between server and client, such as images or files. If you already have a base64 library, then you don't need this, however, this one is highly optimized and will probably be faster than most others.

Recommended for

Programs that have to encode and decode binary data such as images. It can also be used to obfuscate data.

On by default

Yes

JSON_EXPOSE_BASE64

This option exposes an interface to libjson's base64 encoding functions.   Normally, these are hidden behind the scenes (and off unless JSON_BINARY is turned on,) but sometimes you may want a high-speed base64 encoder to accompany libjson. It is inefficient to have a base64 encoder/decoder AND libjson in your project. libjson's encoder and decoder is by far the fastest I've come across, and already therefor you. JSON is often used in networking, and base64 is often also required in networking.

Recommended for

Programs that have to encode and decode binary data such as images. It can also be used to obfuscate data.

On by default

Yes

JSON_ITERATORS

This option turns on iterator functions for libjson. erase, find, insert are exposed when this option is on. In C++ mode you'll find iterator functions to be very STL-like, and there is even support for iterators in the library, but more restrictive.

Recommended for

Programmers familiar and comfortable with STL iterators or need advanced manipulation methods.

On by default

Yes

JSON_STREAM

This option turns on streaming functions for libjson. This allows you buffer json, and send it to the stream a little bit at a time.

Recommended for

Programs that want to buffer json, or need to stream from the internet.

On by default

Yes

JSON_MEMORY_CALLBACKS

This option exposes functions to register callbacks for allocating, resizing, and freeing memory. Because libjson is designed for speed, it is feasible that some users would like to further add speed by having the library utilize a memory pool. With this option turned on, the default behavior is still done internally unless a callback is registered

Recommended for

Programs that want to use custom memory handling functionality, such as memory pools and garbage collection.

On by default

No

JSON_MEMORY_MANAGE

This option exposes functions to bulk delete all memory that libjson has allocated for you. This includes strings and nodes. Usually, you are required to keep track of all of the nodes and strings that libjson creates, but with this option you don't have to.

Recommended for

Programs that use lots of strings and nodes and want to de bulk cleanups or memory managers.

On by default

No

JSON_MEMORY_POOL

This option turns on memory pooling within libjson. This is more efficient usually that just attaching the callbacks to a memory pool because it creates a few of them internally, which are optimized for specific tasks.

JSON is often used for server and/or client communication. This often entails parsing json, then creating json, then ending the session. It doesn't make sense to allocate and deallocate memory over and over again, so the memory pool allocates lots of space for this all at once.

Recommended for

Programs that repeatedly parse json.

On by default

No

JSON_MUTEX_CALLBACKS

This option exposes functions to register callbacks to lock and unlock mutexs and functions to lock and unlock JSONNodes and all of it's children. This does not prevent other threads from accessing the node, but will prevent them from locking it. Because of libjson's extremely complex internal working and reference counting, it is much easier for the end programmer to allow libjson to manage your mutexs because of reference counting and manipulating trees, libjson automatically tracks mutex controls for you, so you only ever lock what you need to.

Recommended for

Programs that require libjson be used in critical sections.

On by default

No

JSON_MUTEX_MANAGE

This option lets you set mutexes and forget them, libjson will not only keep track of the mutex, but also keep a count of how many nodes are using it, and delete it when there are no more references. This changes the registerMutexCallbacks and json_register_mutex_callbacks to require a third deleter callback as well.

Recommended for

Programs that require libjson be used in critical sections and handle it's own mutexes.

Requirements

JSON_MUTEX_CALLBACKS is required to also be defined, if it is not, the build will fail.

On by default

No

JSON_NO_C_CONSTS

This option removes the const qualifier for the function declarations. The functions do not behave any differently, they simply have a slightly different interface.

Recommended for

Programmers who are using legacy C compilers or coding guidelines

On by default

No

JSON_OCTAL

This option turns on features for supporting octal values in strings and numbers. Normally, octal numbers are treated as decimal

Recommended for

People who need octal support

On by default

No

JSON_READ_PRIORITY

This option exposes libjson's parsing functionality, and sets it's priority. By default reading is high priority, but if the majority of your time is spent writing, you can lower the priority to produce a better writing engine.

Recommended for

Programs that need to read json, this is almost everyone.

On by default

Yes (HIGH)

JSON_WRITE_PRIORITY

This option exposes the write and write_formatted functionality. Without this option, libjson is read-only, this allows you to write json as well. This also sets the priority of the writing, some compilers will generate different code depending on the priority that you give.

Recommended for

Programs that need to write json, such as two way communication or recording a config file after it has changed.

On by default

Yes (MED)

JSON_NEWLINE

This option is used for writing formatted json using specialized newlines. By default, libjson will use the UNIX newline character. Simply defining this option is not adequate, you must define it to something. Whatever it's defined to will be used. The JSONOptions.h file included with libjson shows you how, as it defined is as a carriage return followed by a newline character, this is standard on Windows or MS-DOS. You may also want to set it to </br> (the new line tag for HTML.)

Even if you are using unicode, write the value of the newline in regular quotes, libjson will automatically make ii unicode for you (in preprocessor.)

Recommended for

Programs that write formatted JSON that require special newline characters.

On by default

No

JSON_INDENT

This option is used for writing formatted json using specialized indents. By default, libjson will use the ASCII tab character. Simply defining this option is not adequate, you must define it to something. Whatever it's defined to will be used. The JSONOptions.h file included with libjson shows you how, you will most commonly change it to spaces, but HTML might also be common.

Even if you are using unicode, write the value of the newline in regular quotes, libjson will automatically make ii unicode for you (in preprocessor.)

Recommended for

Programs that write formatted JSON that spaces to indent instead of tabs.

On by default

No

JSON_ESCAPE_WRITES

This option is used for writing json where the special characters have been escaped. This is on by default, because without it, the json no longer meets the standards. If it's off special characters like newlines, tabs, and special unicode characters are simply place in the json as they appear. This may cause problems with other JSON engines, and it will not pass validation, so it is recommended that you leave it on.

Recommended for

Programs that write JSON and want to adhere to the JSON standard, or communicate between other json engines.

On by default

Yes

JSON_COMMENTS

This option tells libjson to store and write comments. libjson always supports parsing json that has comments in it as it simply ignores them, but with this option it keeps the comments and allows you to insert further comments.

libjson will automatically determine if comments are multiline or single line and write them accordingly.

Recommended for

Programs that write complex JSON that might be read by human eyes. Comments make JSON easier to understand and alter.

On by default

Yes

JSON_WRITE_BASH_COMMENTS

This option tells libjson to use bash comments to output json with comments. Bash comments are the # character. This also disables multi-line comments in the C-style (/* */). Instead it will simply put multiple lines, all with leading # characters.

Recommended for

Programs that require bash comments, perhaps for DOxygen documentation.

On by default

No

JSON_WRITE_SINGLE_LINE_COMMENTS

This option tells libjson to not use the C-style multi-line comment, as some JSON libraries don't support them. This will write multi-line comments as a series of // comments instead.

Recommended for

Programs that need to output JSON that libraries that don't support multiline comments need to read.

On by default

No

ARRAY_SIZE_ON_ONE_LINE

This option allows libjson to write small arrays all on one line. This is commonly done to make things easier to read, specifically for things like coordinates. This will only affect writing of primitives, objects and arrays are done as normal. You have to set this to an integer, where anything smaller or equal to the value is treated specially.

Recommended for

Programmers who have small arrays of primitives

On by default

No

JSON_VALIDATE

This option exposes validation functions. For programs that might get invalid json, validation might be required before anything is done.

Recommended for

Programs that might receive invalid json.

Requirements

JSON_READ_PRIORITY is required to also be defined, if it is not, the build will fail.

On by default

Yes

JSON_CASE_INSENSITIVE_FUNCTIONS

This option exposes case-insensitive functions. This includes at, get, find...

Recommended for

Programs that don't know the cases of the node names

On by default

Yes

JSON_INDEX_TYPE

This option changes the type that is used to track the number of children. Usually unsigned int is used because it's fast and efficient, but there are cases where it's not desired. For instance, on embedded systems where there is little memory, one might choose to use a short or even a char. Or on huge 64-bit systems where the number of nodes may go outside the range of an unsigned int.

Recommended for

Either very large or very small systems

On by default

No

JSON_BOOL_TYPE

This option changes the bool type in the C interface. This allows you to change the interface to fit the language that you are working with. If this option is not on, then the bool type is an int, but you can make it anything.

Recommended for

Programming languages other than C-based ones

On by default

No

JSON_INT_TYPE

This option changes the int type for as_int. If this option is not on, then int type is a long

Recommended for

People who want to get different types out of the as_int function, possible for high precision.

On by default

No

JSON_NUMBER_TYPE

This option changes the number type for as_float. If this option is not on, then number type is a double in most cases, but in JSON_LESS_MEMORY mode, it squeezes into a float.

Recommended for

People who need extra control, or may want a long double for more precision.

On by default

No

JSON_STRING_HEADER

This option changes the string type that libjson uses for both it's interface and internals. This can be very useful for working with other libraries. For instance, developers using Qt or wxWigdets. Both are very common and have their own string class. Both should be able to be dropped right in without much problem. The class must be named or typedefed json_string.

If you change this option and are using the C++ interface, then you must recompile the entire library because this makes a dynamic dependency that your IDE or compiler will not pick up on.

You are required to implement the following interface

Recommended for

Making interface between libjson and other libraries easier.

On by default

No

JSON_NO_EXCEPTIONS

This option shuts off all exceptions at the interface level. For the functions that throw exceptions, their differences are documented in the method documentation.

Recommended for

Companies that do not allow exception-style error handling.

On by default

No

Note

If you use the JSON_PREPARSE option, exceptions are used internally, other than that, exceptions are completely removed from the library.

JSON_DEPRECATED_FUNCTIONS

This option leaves functions that are not supposed to be used anymore. You will get compiler warnings if you try to use these functions, but they will behave just as they did before they were deprecated.

Recommended for

Backwards compatibility and ease of transition between major versions

On by default

Yes

JSON_SECURITY_MAX_NEST_LEVEL

This option is used to prevent DoS (denial of service) attacks. Hackers sometimes try to use deeply nested JSON to make a server hang, this security option stops libjson from going too deeply. It must be defined as an integer. The security checks are done during validation, not parsing.

Recommended for

Servers with public interfaces

On by default

Yes (128)

JSON_SECURITY_MAX_STRING_LENGTH

This option is used to prevent DoS (denial of service) attacks. Hackers sometimes try to use very long JSON strings to make a server hang, this security option stops libjson from even trying to parse a string that is too large. It must be defined as an integer. The security checks are done during validation, not parsing.

Recommended for

Servers with public interfaces

On by default

Yes (33554432) - 32MB

JSON_SECURITY_MAX_STREAM_OBJECTS

This option is used to prevent DoS (denial of service) attacks. Hackers sometimes try to use very long JSON strings of lots of small objects to make a server hang, this security option stops libjson from even trying to parse a string that is too large. It must be defined as an integer.

Recommended for

Servers with public interfaces

On by default

Yes (128)

JSON_UNIT_TEST

This option is used to maintain and debug the libjson. It makes all private members and functions public so that tests can do checks of the inner workings of libjson. This should not be turned on by end users.

Recommended for

libjson maintainers only.

On by default

No

Testing libjson

libjson should work with any combination of options (excluding illegal ones of course,) but because of the number of options, and platforms, it is not possible to test them all. That is why libjson includes a test suite.

Once you have all of the options set the way that you want them, it is time to test libjson. Unzip the TestSuite zip, and navigate to it in the console.

make [debug | small]
./testapp

Now you will have a new file in the folder: out.html. This will show you all of the tests that were run. Right at the top, you will see whether or not you have any failed tests. If you have failed tests, please report it on sourceforge with your options and setup.

Benchmarking

libjson also comes with a benchmark setup. Navigate to TestSuite/Benchmark and do as you did before.

make [debug | small]
./testapp

This will run 5 loops, which ill allow you to compare speed with different options set. This is useful if you find libjson acting as a bottleneck for some reason. Depending on the speed of your computer, this may take a few minutes.

C interface

libjson has an interface that uses standard C types and a standard C interface. This interface doesn't have to be used in just C, it can be used in Basic, C, C++ and any other language that supports the C interface (most do.) All methods in libjson begin with "json_" to make sure that the names don't collide with other libraries or any of your methods.

JSONNODE types

Function	Description
JSON_NULL	Blank node or "null" (case-less)
JSON_STRING	A string
JSON_NUMBER	A floating point number
JSON_BOOL	A boolean "true" or "false" (case-less)
JSON_ARRAY	An array of JSONNodes
JSON_NODE	A complex JSONNode structure

libjson types

Function	Description
JSONNODE *	Opaque pointer to a node within libjson
JSONNODE_ITERATOR	Random access iterator
JSONSTREAM	Opaque pointer to a stream
json_char Texto	Either char or wchar_t, depending on options
json_number	Either float or double, depending on options
json_index_t	Child node indexing type
json_bool_t	Boolean type
json_int_t	Int type
json_error_callback_t	typedef void (* json_error_callback_t)(const json_char *)
json_stream_callback_t	typedef void (* json_stream_callback_t)(JSONNODE *, void *)
json_stream_e_callback_t	typedef void (* json_stream_e_callback_t)(void *)
json_mutex_callback_t	typedef void (* json_mutex_callback_t)(void *)
json_malloc_t	typedef void * (* json_malloc_t)(unsigned long)
json_realloc_t	typedef void * (* json_realloc_t)(void *, unsigned long)

Function	Description
json_free_t	typedef void (* json_free_t)(void *)

JSONNODE functions

Function	Description
json_new	Construct JSONNode
json_new_a	Constructs a string node
json_new_i	Constructs a integer node
json_new_f	Constructs a floating point node
json_new_b	Constructs a boolean node
json_copy	Copy JSONNode content, usually reference counting
json_duplicate	Copy JSONNode content, forcing a copy
json_delete	Deletes the node
json_delete_all	Deletes all allocated nodes

Inspector functions

Function	Description
json_type	The type of JSONNode it is
json_size	The number of child nodes
json_empty	Tests if the node has children
json_name	The name of the node
json_get_comment	The comment attached to the node
json_as_string	The string value of the node
json_as_int	The integer value of the string
json_as_float	The floating point value of the string
json_as_bool	The boolean value of the string
json_as_node	The node, cast to a JSON_NODE
json_as_array	The node, cast to a JSON_ARRAY
json_as_binary	The node with it's value converted to binary
json_write	Writes the node as JSON text
json_write_formatted	Writes the node as readable JSON text
json_equal	Compare JSONNode contents

Modifier Functions

Function	Description
json_set_a	Sets the contents of the node to a string
json_set_i	Sets the contents of the node to an int
json_set_f	Sets the contents of the node to a float
json_set_b	Sets the contents of the node to a bool
json_set_n	Sets the contents of the node to another node
json_set_name	Sets the name of the node
json_set_comment	Sets the comment attached to the node
json_clear	Removes all children
json_nullify	Nulls out the node
json_swap	Swap the contents of two nodes
json_merge	Merges the contents of two or more nodes
json_preparse	Completely parses the JSON
json_set_binary	Sets the binary value of the node
json_cast	Change the node's type

Streaming Functions

Function	Description
json_new_stream	Creates a stream
json_stream_push	Pushes data onto the stream
json_delete_stream	Deletes the stream

Children Access Functions

Function	Description
json_at	Access item by index
json_get	Access item by name or index
json_get_nocase	Assess item by name, case-insensitive
json_reserve	Reserve enough space
json_push_back	Adds a child
json_pop_back_at	Removes and returns an item by index
json_pop_back	Removes and returns an item by name
json_pop_back_nocase	Removes and returns an item by name, case-insensitive
json_find	Finds a node by name
json_find_nocase	Finds a node by name, case-insensitive
json_erase	Removes an item
json_erase_multi	Remove a set of children
json_insert	Adds a child
json_insert_multi	Insert a set of children

Iterator Functions

Function	Description
json_begin	Return iterator to beginning
json_end	Return iterator to end

Thread Safety Functions

Function	Description
json_lock	Return iterator to end
json_unlock	Return reverse iterator to reverse beginning
json_set_mutex	Attaches a mutex to the node
json_set_global_mutex	Sets the global mutex

JSON Functions

Function	Description
json_parse	Parses json
json_parse_unformatted	Parses son that has no white spaces
json_strip_white_space	Removes all white space and comment
json_is_valid	Validates json
json_is_valid_unformatted	Validates json that has no white spaces
json_validate (deprecated)	Validates json and if it's valid, return an object

Callback Registration

Function	Description
json_register_debug_callback	Registers error callback
json_register_mutex_callbacks	Register mutex callbacks
json_register_memory_callbacks	Registers the memory callbacks

Cleanup Functions

Function	Description
json_free	Frees memory of a string
json_free_all	Frees memory of all strings that libjson had allocated

Base64 Functions

Function	Description
json_encode64	Base64 encodes data
json_decode64	Decodes Base64 data

Text Functions

Function	Description
JSON_TEXT	Creates a text string in the right format

json_new

JSONNODE * json_new (char mytype);

New Node

This function creates an empty node of the specified type. This would normally be used to start serializing something or writing a configuration file. You must json_delete the resulting node or attach it to something as a child.

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be explicitly json_deleted.

Parameters

mytype
The enumerated type of the JSONNODE.

Return Value

Empty node

Complexity

Constant

json_new_a

JSONNODE * json_new_a (const json_char * name, const json_char * value);

New Node

This function creates a string node with the name and value specified. You must json_delete the resulting node or attach it to something as a child.

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be
explicitly json_deleted.
JSON_SAFE - Allows value to be NULL

Parameters

name
The node's name, this may be NULL
value
The node's value, this should not be NULL

Return Value

A new node

Complexity

Constant

json_new_i

JSONNODE * json_new_i(const json_char * name, json_int_t value);

New Node

> This function creates a integer node with the name and value specified. You must json_delete the resulting node or attach it to something as a child.

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be
> explicitly json_deleted.

Parameters

name
> The node's name, may be NULL

value
> The node's value

Return Value

A new node

Complexity

Constant

json_new_f

JSONNODE * json_new_f(const json_char * name, json_number value);

New Node

This function creates a floating point node with the name and value specified. You must json_delete the resulting node or attach it to something as a child.

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be explicitly json_deleted.

Parameters

name
　　　The node's name, may be NULL
value
　　　The node's value

Return Value

A new node

Complexity

Constant

json_new_b

JSONNODE * json_new_b(const json_char * name, json_bool_t value);

New Node

This function creates a boolean node with the name and value specified. You must json_delete the resulting node or attach it to something as a child.

It's important to note that this function takes an int as the value, Some languages do not have a bool type (including C89.)

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be explicitly json_deleted.

Parameters

name
        The node's name, may be NULL
value
        The node's value

Return Value

A new node

Complexity

Constant

json_copy

JSONNODE * json_copy(const JSONNODE * node);

Copy Node

       This function copies a JSONNODE and returns the new copy. With reference counting, this operation is extremely fast. If you want a literal copy and not a reference count, use json_duplicate.

Option Differences

JSON_MEMORY_MANAGER - Will keep a reference to the resulting node, so it doesn't have to be
       explicitly json_deleted.
JSON_REF_COUNT - if this is turned off, the copy constructor will fully duplicate the node

Parameters

node
       The node to be copied

Return Value

An exact copy of the node parameter

Complexity

Constant, unless JSON_REF_COUNT is on, in which case it's the same as json_duplicate.

json_duplicate

JSONNODE * json_duplicate(const JSONNODE * node);

Duplicating JSONNODE

Constructs a JSONNODE object, by copying the contents of JSONNODE. This is different from the json_copy because it makes a literal copy, not reference counting.

Option Differences

None

Parameters

node
 The node to be copied

Return Value

A JSONNode that is a new copy of the original node.

Complexity

Linear on json_size, however, because JSON is a tree structure it's worse case scenario is linear on json_size + json_size of each child recursively.

json_delete

void json_delete(JSONNODE * node);

Destruct JSONNODE

Destructs the JSONNode object and cleans itself up.

Option Differences

None

Parameters

node
          The node to be deleted

Return Value

None

Complexity

          Depends on circumstances. If it's reference count is not one, then it's complexity is constant, if it's the sole owner of it's value, then it becomes linear on JSONNode::size, however, because JSON is a tree structure it's worse case scenario is linear on JSONNode::size + JSONNode::size of each child recursively.

json_delete_all

void json_delete_all(void);

Destruct All JSONNODEs

Deletes all nodes that have been allocated by libjson. This is for bulk delete when you are done with libjson for the time.

Option Differences

JSON_MEMORY_MANAGER - Is required to use this function

Parameters

None

Return Value

None

Complexity

Complexity of json_delete for each node.

json_new_stream

JSONSTREAM * json_new_stream(json_stream_callback_t callback, json_stream_e_callback_t e_callback, void * id);

New Stream

This function creates a stream. Streams are used for pushing small amounts of json at a time, it may be incomplete json, or even multiple json nodes, and the callback you give it will be called whenever a complete node is recognized.

Your callback must assume that the node given to it will be immediately deleted once the callback is finished, so if you need to keep it, you must copy it.

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

callback
        The method that gets called whenever nodes are completed
e_callback
        The method that gets called whenever the stream encounters bad json
id
        The pointer that will get passed back into the callback method JSONSTREAM_SELF is
        recommended, as it will tell the callback to use itself as the pointer

Return Value

A new stream

Complexity

Constant

json_stream_push

void json_stream_push(JSONSTREAM * stream, json_char * text);

Push to stream

Pushes more text to the stream. If the stream sees that you have completed a node, it will call the callback.

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

stream
> The stream to push onto

text
> The text to add to the stream

Return Value

None

Complexity

Constant

json_stream_reset

void json_stream_reset(JSONSTREAM * stream);

Resets a stream

Resets a stream object

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

stream
The stream to reset

Return Value

None

Complexity

Constant

json_type

char json_type(JSONNODE * node);

Return type

Returns the type of the JSONNODE.

Option Differences

None

Parameters

Return Value

The type of the node.

Complexity

Constant

json_size

json_index_t json_size(JSONNODE * node);

Return size

Returns the number of children that the node has. This should be zero for anything other than JSON_ARRAY or JSON_NODE, but this is only guaranteed with the JSON_SAFE option turned on. This is because casting may or may not purge the children.

Option Differences

JSON_SAFE - will guarantee that anything other than JSON_NODE and JSON_ARRAY will return 0.

Parameters

None

Return Value

The number of children that the node has.

Complexity

Constant.

json_empty

int json_empty(JSONNODE * node);

Return empty

Returns whether or not the node has any children. If the node is not of JSON_NODE or JSON_ARRAY it will invariably return true. Note that it returns an int, because some languages do not have a bool type.

Option Differences

None

Parameters

node
    The node to perform this function on

Return Value

Whether or not the node is empty

Complexity

Constant.

json_name

json_char * json_name(JSONNODE * node);

Return name

Returns the name of the node. If there is no name, then it returns a blank string.

Option Differences

None

Parameters

node
> The node to perform this function on

Return Value

The name of the string.

Complexity

Constant.

json_get_comment

json_char * json_get_comment(JSONNODE * node);

Return comment

Returns the comment attached to the node

Option Differences

JSON_COMMENTS - If this option is turned off, this function is not exposed

Parameters

node
      The node to perform this function on

Return Value

The comment of the node

Complexity

Constant.

json_as_string

json_char * json_as_string(JSONNODE * node);

Return string value

Returns the string representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	"" or "null" depending on how it was created
JSON_STRING	The unescaped string value
JSON_NUMBER	The number in string form (may be in scientific notation)
JSON_BOOL	"true" or "false"
JSON_ARRAY	""
JSON_NODE	""

Notice that both JSON_NODE and JSON_ARRAY return empty strings. Use json_write and json_write_formatted to output JSON.

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_STRING

Parameters

node
        The node to perform this function on

Return Value

The string representation of the node.

Complexity

Constant.

json_as_int

json_int_t json_as_int(JSONNODE * node);

Return int value

Returns the integer representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	0
JSON_STRING	Truncated atof(as_string)
JSON_NUMBER	Truncated Value
JSON_BOOL	1 if true, 0 if false
JSON_ARRAY	Undefined
JSON_NODE	Undefined

If the value is actually a floating point value, then libjson will record an error via it's callback, but will continue on ahead and simply truncate the value. So 15.9 will be returned as 15. If JSON_DEBUG is turned on, it will also error if the value of the node is outside the range of the long long datatype.

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_NUMBER

Parameters

node
        The node to perform this function on

Return Value

The integer representation of the node.

Complexity

Constant.

json_as_float

json_number json_as_float(JSONNODE * node);

Return floating point value

Returns the floating point representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	0.0
JSON_STRING	atof(as_string)
JSON_NUMBER	Value
JSON_BOOL	1.0 if true, 0.0 if false
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_NUMBER

Parameters

node
        The node to perform this function on

Return Value

The floating point representation of the node.

Complexity

Constant.

json_as_bool

int json_as_bool(JSONNODE * node);

Return bool value

Returns the boolean representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	FALSE
JSON_STRING	Undefined
JSON_NUMBER	Value == 0.0
JSON_BOOL	Value
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_BOOL

Parameters

node
        The node to perform this function on

Return Value

The boolean representation of the node.

Complexity

Constant.

json_as_node

JSONNODE * json_as_node(JSONNODE * node);

Return node value

Returns the node representation of the node. For anything other than node and array, it simply returns an empty node. If the caller is an array, it will convert it to a node.

Function	Description
JSON_NULL	Empty node
JSON_STRING	Empty node
JSON_NUMBER	Empty node
JSON_BOOL	Empty node
JSON_ARRAY	Array converted to a node
JSON_NODE	A copy of the node

This command creates a new JSONNODE that has to be deleted or attached to a parent.

Option Differences

None

Parameters

node
        The node to perform this function on

Return Value

The node representation of the node.

Complexity

Constant for all except JSON_ARRAYs and JSON_NODEs which are the same as the json_copy function.

json_as_array

JSONNODE * json_as_array(JSONNODE * node);

Return array value

Returns the array representation of the node. For anything other than node and array, it simply returns an empty array. If the caller is an node, it will convert it to an array by stripping all of the names of each child.

Function	Description
JSON_NULL	Empty node
JSON_STRING	Empty node
JSON_NUMBER	Empty node
JSON_BOOL	Empty node
JSON_ARRAY	A copy of the array
JSON_NODE	An array of the children

This command creates a new JSONNODE that has to be deleted or attached to a parent.

Option Differences

None

Parameters

node
        The node to perform this function on

Return Value

The node representation of the node.

Complexity

Constant for anything other than a node. For a JSON_NODE, it is linear with respect to json_size, and JSON_ARRAY which is the same as the json_copy function.

json_as_binary

void * json_as_binary(JSONNODE * node, unsigned long * size);

Return binary value

Returns the binary value that was part of this node. It returns a byte array which is the original binary data. It gives you how large the array is by the pass by pointer size parameter.

Function	Description
JSON_NULL	Undefined
JSON_STRING	The binary data from the decoded Base64
JSON_NUMBER	Undefined
JSON_BOOL	Undefined
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_BINARY - If this option is not on, then this function is not accessible.

Parameters

node
> The node to perform this function on

size
> A pointer to an unsigned long, which will tell you how many bytes the data is

Return Value

The Base64 decoded binary data

Complexity

Linear with respect to the length of the binary data

json_write

json_char * json_write(JSONNODE * node);

Write JSON

Returns JSON text, with no white space or comments. Designed to create JSON that is very small, and therefore, faster to send between servers or write to a disk. The flipside is that it's nearly impossible to read by human eyes.

Only root nodes (JSON_NODE and JSON_ARRAYs) are meant to be written, all others will return a blank string.

Option Differences

JSON_WRITER - If this option is not on, then this function is not accessible.
JSON_ESCAPE_WRITES - Escapes special characters

Parameters

node
        The node to perform this function on

Return Value

JSON text of the node being written

Complexity

Linear with respect to the size of the tree underneath the node.

json_write_formatted

json_char * json_write_formatted(JSONNODE * node);

Write JSON

Returns JSON text that has been indented and prettied up so that it can be easily read and modified by humans.

Only root nodes (JSON_NODE and JSON_ARRAYs) are meant to be written, all others will return a blank string.

Option Differences

JSON_WRITER - If this option is not on, then this function is not accessible.
JSON_COMMENTS - If this option is not turned on, the no comments are written
JSON_WRITE_BASH_COMMENTS - This option will make libjson write only bash style # comments
JSON_WRITE_SINGLE_LINE_COMMENTS - This option will make libjson not write C-style /* */ comments
JSON_ESCAPE_WRITES - Escapes special characters

Parameters

node
        The node to perform this function on

Return Value

JSON text of the node being written

Complexity

Linear with respect to the size of the tree underneath the node.

json_equal

int json_equal(JSONNODE * node1, JSONNODE * node2);

Comparing JSONNODE

Checks if the value held within the nodes are equal. This ignores things like comments, but for JSON_NODE and JSON_ARRAYs, this is a deep comparison, checking each child too.

Option Differences

None

Parameters

node1
    The value to compare to
node2
    Another node to compare to

Complexity

Constant except for JSON_NODEs and JSON_ARRAYs in which case it's linear with respect to size() and size() of each child recursively.

json_set_a

void json_set_a(JSONNODE * node, json_char * value);

Setting the node's value

Sets the string value of the JSONNODE.

Option Differences

JSON_SAFE - Allows value to be NULL

Parameters

node
        The node to perform this function on
value
        The new value of the node, shouldn't be NULL unless JSON_SAFE is on

Return Value

None

Complexity

Constant

json_set_i

void json_set_i(JSONNODE * node, json_int_t value);

Setting the node's value

Sets the integer value of the JSONNODE.

Option Differences

Parameters

node
        The node to perform this function on
value
        The new value of the node

Return Value

None

Complexity

Constant

json_set_f

void json_set_f(JSONNODE * node, json_number value);

Setting the node's value

Sets the floating point value of the JSONNODE.

Option Differences

None

Parameters

node
>   The node to perform this function on

value
>   The new value of the node

Return Value

None

Complexity

Constant

json_set_b

void json_set_b(JSONNODE * node, json_bool_t value);

Setting the node's value

Sets the boolean value of the JSONNODE. The value is an int because of the missing bool datatype in C.

Option Differences

None

Parameters

node
> The node to perform this function on

value
> The new value of the node

Return Value

None

Complexity

Constant

json_set_n

void json_set_n(JSONNODE * node, JSONNODE * value);

Setting the node's value

Sets the value of the JSONNODE to the value of the other, usually through fast and simple reference counting.

Option Differences

None

Parameters

node
>   The node to perform this function on

value
>   The new value of the node

Return Value

None

Complexity

Constant

json_set_name

void json_set_name(JSONNODE * node, json_char * name_t);

Setting the node's name

Sets the name of the JSONNode.

Option Differences

JSON_SAFE - name_t can be NULL

Parameters

node
        The node to perform this function on
name_t
        The name of the node

Return Value

None

Complexity

Constant

json_set_comment

void json_set_comment(JSONNODE * node, json_char * comment_t);

Setting the node's comment

Sets the comment that will be associated with the JSONNode.

Option Differences

JSON_COMMENTS - this option is required to expose this function
JSON_SAFE - comment_t can be NULL

Parameters

node
        The node to perform this function on
comment_t
        The comment attached to the node

Return Value

None

Complexity

Constant

json_clear

void json_clear(JSONNODE * node);

Clearing a node

Clears all children from the node.

Option Differences

None

Parameters

node
> The node to perform this function on

Return Value

None

Complexity

Linear with respect to the size of the tree underneath it

json_swap

void json_swap(JSONNODE * node1, JSONNODE * node2);

Swaps the contents of nodes

Swaps the contents of two nodes. This is very fast because JSONNODE is just a wrapper around an internal structure, so it simply swaps pointers to those structures.

Option Differences

None

Parameters

node1
> The node to perform this function on

node2
> The node to swap values with

Return Value

None

Complexity

Constant

json_merge

void json_merge(JSONNODE * node1, JSONNODE * node2);

Merge the contents of nodes

It's possible that you may end up with multiple copies of the same node, through duplication and such. To save space, you might want to merge the internal reference counted structure. Obviously, this only makes a difference if reference counting is turned on.

libjson will try and do this efficiently, merging with the internal structure that has the highest reference count.

Option Differences

JSON_REF_COUNT - this option is required for this to do anything

Parameters

node
        The node to perform this function on
node2
        One of the other nodes to merge with.

Return Value

None

Complexity

Constant

json_preparse

void json_preparse(JSONNODE * node);

Preparse the json

libjson's lazy parsing makes parsing JSON that is not entirely used very fast, but sometimes you want to parse it all at once, making the next reads a little faster

Option Differences

JSON_PREPARSE - this option does this automatically, so it hides this function

Parameters

node
    The node to perform this function on

Return Value

None

Complexity

Linear with respect to the total number of nodes in the JSON

json_set_binary

void json_set_binary(JSONNODE * node, const void * bin, unsigned long bytes);

Set binary data

libjson's built in Base64 encoder will create a JSON_NODE with Base64 encoded binary data, which allows you to send images and files around. libjson's Base64 encoder is faster than most others, so it's recommended that you use this method rather than other libraries.

Option Differences

JSON_BINARY - this option is required to use this method and the Base64 method

Parameters

node
      The node to perform this function on
bin
      binary data
bytes
      the number of bytes that the binary data is

Return Value

None

Complexity

Linear with respect to the number of bytes

json_cast

void json_cast(JSONNODE * node, char type);

Cast to a different type

Will change the node to a different type and do any conversions necessary.

Option Differences

None

Parameters

node
> The node to perform this function on

type
> New type of node

Return Value

None

Complexity

Constant except for casting a node to array which is linear with respect to json_size.

json_at

JSONNODE * json_at(JSONNODE * node, json_index_t pos);

Getting a child

This will give you a reference to a child node at a specific location. This is a safe function and will return zero if you go out of bounds. The returned value is still a child, so do not try and delete the results.

Option Differences

None

Parameters

node
>   The node to perform this function on

pos
>   The index of the child node

Return Value

The child at the desired location.

Complexity

Constant

json_get

JSONNODE * json_get(JSONNODE * node, json_char * name);

Getting a child

This will give you a reference to a child node by its name. This is a safe function and will return zero if that child does not exist. The returned value is still a child, so do not try and delete the results.

Option Differences

None

Parameters

node
        The node to perform this function on
name
        The name of the child node

Return Value

The child at the desired location.

Complexity

Linear with respect to json_size

json_get_nocase

JSONNODE * json_get_nocase(JSONNODE * node, json_char * name);

Getting a child

This will give you a reference to a child node by its name. This is a safe function and will return zero if that child does not exist. The returned value is still a child, so do not try and delete the results.

Option Differences

JSON_CASE_INSENSITIVE_FUNCTIONS is required to use this function

Parameters

node
          The node to perform this function on
name
          The name of the child node

Return Value

The child at the desired location.

Complexity

Linear with respect to json_size.

json_reserve

void json_reserve(JSONNODE * node, json_index_t size);

Reserving space

This function reserves children space, this makes the program faster and use less memory as it doesn't have to keep allocating new memory when it runs out.

Option Differences

JSON_LESS_MEMORY - Causes this method to do nothing

Parameters

node
        The node to perform this function on
size
        The size to reserve

Return Value

None

Complexity

If there is already some children it's linear with respect to json_size unless the reserved amount is less than the current capacity, in which case it's constant. If there are no children, then it's constant.

json_push_back

void json_push_back(JSONNODE * node, JSONNODE * child);

Adding a child

This function pushes a new child node on the back of the child list. The child is then managed, so do not try and delete it later.

Option Differences

None

Parameters

node
> The node to perform this function on

child
> The node to be added as a child

Return Value

None

Complexity

Constant

json_pop_back_at

JSONNODE * json_pop_back_at(JSONNODE * node, json_index_t pos);

Getting a child

This will give remove a JSONNODE from it's parent and return it to you. Because it's removed from the parent, you must delete it yourself.

Option Differences

None

Parameters

node

       The node to perform this function on

pos

       The index of the child node

Return Value

The child at the desired location by value.

Complexity

Linear based on json_size minus pos. This is because the references of the other children have to be shifted.

json_pop_back

JSONNODE * json_pop_back(JSONNODE * node, json_char * name);

Getting a child

This will give remove a JSONNODE from it's parent and return it to you. Because it's removed from the parent, you must delete it yourself.

Option Differences

None

Parameters

node
> The node to perform this function on

pos
> The index of the child node

name
> The name of the child node

Return Value

The child at the desired location by value.

Complexity

Linear based on json_size.

json_pop_back_nocase

JSONNODE * json_pop_back_nocase(JSONNODE * node, json_char * name);

Getting a child

This will give remove a JSONNODE from it's parent and return it to you. Because it's removed from the parent, you must delete it yourself.

Option Differences

JSON_CASE_INSENSITIVE_FUNCTIONS is required to use this function

Parameters

node
> The node to perform this function on

name
> The name of the child node

Return Value

The child at the desired location.

Complexity

Linear with respect to json_size.

json_find

JSONNODE_ITERATOR json_find(JSONNODE * node, json_char * name);

Getting a child

Searches through the children and finds an iterator to it. This function returns json_end if the child does not exist.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
       The node to perform this function on
name
       The name of the child node

Return Value

An iterator that points to the child requested, or json_end if it wasn't found.

Complexity

Linear based on json_size.

json_find_nocase

JSONNODE_ITERATOR json_find_nocase(JSONNODE * node, json_char * name);

Getting a child

Searches through the children and finds an iterator to it. This function returns json_end if the child does not exist.

Option Differences

JSON_ITERATORS and JSON_CASE_INSENSITIVE_FUNCTIONS must be on to use this function

Parameters

node
>   The node to perform this function on

name
>   The name of the child node

Return Value

An iterator that points to the child requested, or json_end if it wasn't found.

Complexity

Linear based on json_size.

json_erase

JSONNODE_ITERATOR json_erase(JSONNODE * node, JSONNODE_ITERATOR pos);

Removing a child

Erases a single child and returns the iterator to the next one.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
> The node to perform this function on

pos
> The position of the node that is to be deleted

Return Value

An iterator that points to the child after the deleted one, or json_end

Complexity

Linear based on json_size minus where it starts from due to memory shifting.

json_erase_multi

JSONNODE_ITERATOR json_erase_multi(JSONNODE * node, JSONNODE_ITERATOR start, JSONNODE_ITERATOR end);

Removing a child

Erases a single child and returns the iterator to the next one.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node

      The node to perform this function on

start

      The position of starting node to be deleted (inclusively)

end

      The position of ending node to be deleted (inclusively)

Return Value

An iterator that points to the child after the deleted one, or json_end

Complexity

Linear based on json_size minus where it starts from due to memory shifting.

json_insert

JSONNODE_ITERATOR json_insert(JSONNODE * node, JSONNODE_ITERATOR pos, JSONNODE * child);

Adding a child

These functions place a new child into your node before the node pointed to by the iterator. This functions copy the nodes, they remain where they are as well, so you must delete it.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
> The node to perform this function on

pos
> The position to insert before

child
> The node to be inserted

Return Value

An iterator that points to the first inserted node

json_insert_multi

JSONNODE_ITERATOR json_insert_multi(JSONNODE * node, JSONNODE_ITERATOR start, JSONNODE_ITERATOR end);

Adding a child

These functions place a new child into your node before the node pointed to by the iterator. This functions copy the nodes, they remain where they are as well, so you must delete it.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
> The node to perform this function on

pos
> The position to insert before

start
> Position to start copying (inclusively)

end
> Position to stop copying (inclusively)

Return Value

An iterator that points to the first inserted node

Complexity

Linear based on json_size minus where it starts from due to memory shifting plus end minus start for the ranged variety.

json_begin

JSONNODE_ITERATOR json_begin(JSONNODE * node);

Getting start of children

This function gets you an iterator pointing to the beginning of the children.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
    The node to perform this function on

Return Value

An iterator that points to the first child

Complexity

Constant

json_end

JSONNODE_ITERATOR json_end(JSONNODE * node);

Getting end of children

This function gets you an iterator pointing past the end of the children.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

node
        The node to perform this function on

Return Value

An iterator that points past the last child

Complexity

Constant

json_lock

void json_lock(JSONNODE * node, int threadID);

Lock a mutex

This function locks the mutex attached to a node, and locks anything sharing the lock in a different thread. The reason for the threadID parameter is that because libjson passes around structures behind the scenes it might be possible to try and lock the same lock in multiple places in the same critical section. Counting locks per thread eliminates this problem.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function

Parameters

node
    The node to perform this function on
threadID
    A unique id for this thread

Return Value

None

Complexity

Constant

json_unlock

void json_unlock(JSONNODE * node, int threadID);

Unlock a mutex

This function unlocks the mutex attached to a node. If the mutex has been locked multiple times by the same thread, then it will wait until all locks have been released before actually doing the unlock.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function

Parameters

node
        The node to perform this function on
threadID
        A unique id for this thread

Return Value

None

Complexity

Constant

json_set_mutex

void json_set_mutex(JSONNODE * node, void * mutex);

Set a lock

This function attaches a mutual exclusion lock for the node. It can be locked and unlocked by using the lock and unlock functions, The reason for this is that because libjson's complex reference counting and internal magic, it is difficult to be sure that you track data correctly, so libjson will pass this mutex around it's internal system and track it for you.

You can pass NULL to this function to unset a mutex.

This method will filter the mutex down to all children as well, and anything that you add to it later.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function
JSON_MUTEX_MANAGER - if this option is on, then libjson will automatically delete this mutex when it
runs out of references to it

Parameters

node
The node to perform this function on
mutex
A pointer to a mutex of any type (POSIX, Windows…)

Return Value

None

Complexity

Linear with json_size and json_size of each child recursively.

json_set_global_mutex

void json_set_global_mutex(void * mutex);

Register library-wide mutex

      This function sets a global mutex for libjson. This is not the same as the manager mutex that you are required to register in register_mutex_callbacks. This mutex is a fallback mutex that gets locked when you attempt to lock a node that has no mutex attached to it. You may wish to omit assigning mutexes for each node and just let them all use the global one.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this feature

Parameters

mutex
      A mutex that libjson will use when it doesn't have any to use

Return Value

None

Complexity

Constant

json_parse

JSONNODE * json_parse(const json_char * json);

Parse JSON text

This function parses JSON text and returns you a JSONNode which is the root node of the text that you just passed it. If bad JSON is sent to this method it may return NULL.

Option Differences

JSON_SAFE - a node of type JSON_NULL will be returned if the json was invalid

Parameters

json
    JSON text

Return Value

The root node of the text

Complexity

Linear depending on strlen(json)

json_parse_unformatted

JSONNODE * json_parse_unformatted(const json_char * json);

Parse JSON text

This function parses JSON text and returns you a JSONNode which is the root node of the text that you just passed it. If bad JSON is sent to this method it may return NULL. This method assumes that the JSON has no whitespace, or comments.

Option Differences

JSON_SAFE - a node of type JSON_NULL will be returned if the json was invalid

Parameters

json
JSON text

Return Value

The root node of the text

Complexity

Linear depending on strlen(json)

json_strip_white_space

json_char * json_strip_white_space(const json_char * json);

Parse JSON text

      This function removes anything that the JSON standard defines as white space, including extra tabs, spaces, formatting, and comments. This makes this function useful for compressing json that needs to be stored or sent over a network.

Option Differences

None

Parameters

json
      JSON text

Return Value

Valid JSON that is free of all white space

Complexity

Linear depending on strlen(json)

json_is_valid

json_bool_t json_is_valid(const json_char * json);

Validate JSON text

This function validates the text by parsing it completely and looking for anything that is malformed.

Option Differences

JSON_VALIDATE must be on to use this feature

Parameters

json
JSON text

Return Value

whether or not the json is valid

Complexity

Linear depending on strlen(json) and the number of nodes within the text.

json_is_valid_unformatted

json_bool_t json_is_valid_unformatted(const json_char * json);

Validate JSON text

This function validates the text by parsing it completely and looking for anything that is malformed. This is the version to use if your json doesn't have any white space or comments.

Option Differences

JSON_VALIDATE must be on to use this feature

Parameters

json
JSON text

Return Value

whether or not the json is valid

Complexity

Linear depending on strlen(json) and the number of nodes within the text.

json_validate (deprecated)

JSONNODE * json_validate(const json_char * json);

Validate JSON text

This function validates the text by parsing it completely and looking for anything that is malformed. If bad JSON is sent to this method it will return NULL, otherwise it will return the parsed object.

This function will be removed shortly, you are advised to replace all validate calls to json_is_valid and json_parse functions.

Option Differences

JSON_VALIDATE, and JSON_DEPRECATED_FUNCTIONS must be on to use this feature

Parameters

json
JSON text

Return Value

The root node of the text

Complexity

Linear depending on strlen(json) and the number of nodes within the text.

json_register_debug_callback

void json_register_debug_callback(json_error_callback_t callback);

Register error callback

This callback allows libjson to tell you exactly what is going wrong in your software, making debugging and fixing the problem much easier.

Option Differences

JSON_DEBUG must be on to use this feature

Parameters

callback
A method that must have this prototype: static void callback (const json_char * message)

Return Value

None

Complexity

Constant

json_register_mutex_callbacks

void json_register_mutex_callbacks(json_mutex_callback_t lock, json_mutex_callback_t unlock, void * manager_mutex);
void json_register_mutex_callbacks(json_mutex_callback_t lock, json_mutex_callback_t unlock, json_mutex_callback_t destroy, void * manager_mutex);

Register mutex callbacks

This callback allows libjson to lock mutexes that you assign to JSONNode structures. Because libjson has no idea what kind of mutex you gave it, it can't lock it without the help of a callback. This method is required to run before any locking can take place.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this feature
JSON_MUTEX_MANAGER must be on to use the second variant

Parameters

lock
> A method that locks a mutex and must have this prototype: static void callback (void * mutex).

unlock
> A method that unlocks a mutex and must have this prototype: static void callback (void * mutex).

destroy
> A method that deletes a mutex and must have this prototype: static void callback (void * mutex). This parameter is only allowed if JSON_MUTEX_MANAGER is defined, otherwise, you are responsible for cleaning up you mutexes.

manager_mutex
> A mutex that libjson will need to use to handle all of the mutexes, as even without JSON_MUTEX_MANAGER, some management takes place and libjson has a few critical sections when threading. May not be the same as the global mutex.

Return Value

None

Complexity

Constant

json_register_memory_callbacks

void json_register_memory_callbacks(json_malloc_t allocer, json_realloc_t reallocer, json_free_t freer);

Register memory handling

This function sets callbacks that libjson will use to allocate memory. This allows you to keep a tight control of memory allocation, or use things like memory pool and such. These methods are currently not allowed to return null or less than it asked for, as it will cause instability in libjson.

Option Differences

JSON_MEMORY_CALLBACKS must be on to use this feature

Parameters

allocer
> A method that must have this prototype: static void * alloc(unsigned long bytes)

reallocer
> A method that must have this prototype: static void * realloc(void * buffer, unsigned long bytes)

freer
> A method that must have this prototype: static void dealloc(void * buffer)

Return Value

None

Complexity

Constant

json_free

void json_free(void * str);

Frees text

   This function removes the memory allocated by various functions that return strings, such as json_as_string, json_as_binary, json_write…

Option Differences

None

Parameters

str
   Memory that libjson allocated

Return Value

None

Complexity

Constant unless JSON_MEMORY_MANAGE is defined in which case it's logarithmic depending on the number of strings currently allocated.

json_free_all
void json_free_all(void);

Frees text

This function removes all of the memory that libjson has allocated for strings and binary. This allows for bulk frees and garbage collection.

Option Differences

JSON_MEMORY_MANAGE is required to use this function

Parameters

None

Return Value

None

Complexity

Constant

json_encode64

json_char * json_encode64(const void * binary, json_index_t bytes);

Encodes data

This function takes binary data and does a base64 encoding so that you can send it through a text only protocol,

Option Differences

JSON_EXPOSE_BASE64 is required to use this function

Parameters

binary
    binary data
bytes
    the number of bytes in the binary buffer

Return Value

Base 64 encoded string

Complexity

Linear

json_decode64

void * json_decode64(const json_char * text, unsigned long * bytes);

Encodes data

This function takes base64 encoded data and decodes it for you

Option Differences

JSON_EXPOSE_BASE64 is required to use this function

Parameters

text
base64 encoded text
bytes
the number of bytes in the returned binary buffer

Return Value

Decoded binary data. Note: This is raw data, it is NOT a null terminated string

Complexity

Linear

JSON_TEXT

Converts text

This is a marco that you can use to wrap around text that you pass into libjson. It automatically prepends an L in unicode mode and does nothing when not in unicode mode. This allows you to use the same code for unicode and non unicode software.

C++ interface

libjson has an interface specifically designed for C++. It's designed for the following things: speed, heavy internal optimization, and ease of use. The interface should be very intuitive to those familiar with STL and uses standard overloaded operators.

Because so many of the functions in JSONNode are inline, the merge between your program and the library at the optimization level allows more optimization that if the library was external. Your program will run faster and use less memory because of this.

There are two main interfaces here: libjson and JSONNode. libjson is for parsing and registering callbacks and JSONNode is the worker and the structure that stores and manipulates JSON once it's been loaded.

This part of the document is set up to look like cplusplus.com's reference manual, so that it should be easy to navigate and find everything that you're looking for.

JSONNode

        JSONNode is the basic class for holding JSON values. It is a reference-counted, copy-on-write class that adheres to standard C++ practices. It has a very small footprint, both in memory and on the processor. It's interface is similar to anything in STL, and should be very intuitive.
        There are several types of JSONNodes, but they all share the same class.

JSONNode types

Function	Description
JSON_NULL	Blank node or "null" (case-less)
JSON_STRING	A string
JSON_NUMBER	A floating point number
JSON_BOOL	A boolean "true" or "false" (case-less)
JSON_ARRAY	An array of JSONNodes
JSON_NODE	A complex JSONNode structure

Member types

Function	Description
iterator	Random access iterator
const_iterator	Constant random access iterator
reverse_iterator	A reverse random access iterator
reverse_const_iterator	A constant reverse random access iterator
json_string	Either std::string or std::wstring, depending on options
json_char	Either char or wchar_t, depending on options
json_number	Either float or double, depending on options
json_index_t	Child node indexing type
auto_lock	A scoped locking mechanism for JSONNodes

Class functions

Function	Description
(constructor)	Construct JSONNode
(destructor)	JSONNode destructor
duplicate	Copy JSONNode content, forcing a copy
operator =	Copy JSONNode content, usually reference counting

Inspector functions

Function	Description
type	The type of JSONNode it is
size	The number of child nodes
empty	Tests if the node has children
name	The name of the node
get_comment	The comment attached to the node
as_string	The string value of the node
as_int	The integer value of the string
as_float	The floating point value of the string
as_bool	The boolean value of the string
as_node	The node, cast to a JSON_NODE
as_array	The node, cast to a JSON_ARRAY
as_binary	The node with it's value converted to binary
dump	Dumps the inner working of the node into JSON
write	Writes the node as JSON text
write_formatted	Writes the node as readable JSON text
operator [cast]	Casts the value of the node to a specific type

Comparison Functions

Function	Description
operator ==	Compare JSONNode contents

Function	Description
operator !=	Compare JSONNode contents

Modifier Functions

Function	Description
set_name	Sets the name of the node
set_comment	Sets the comment attached to the node
clear	Removes all children
nullify	Nulls out the node
swap	Swap the contents of two nodes
merge	Merges the contents of two or more nodes
preparse	Completely parses the JSON
set_binary	Sets the binary value of the node
cast	Change the node's type

Children Access Functions

Function	Description
at	Access item by name or index
at_nocase	Assess item by name, case-insensitive
operator []	Assess item by name or index
reserve	Reserve enough space
push_back	Adds a child
pop_back	Removes and returns an item by name or index
pop_back_nocase	Removes and returns an item by name, case-insensitive
find	Finds a node by name
find_nocase	Finds a node by name, case-insensitive
erase	Removes an item
insert	Adds a child

Iterator Functions

Function	Description
begin	Return iterator to beginning
end	Return iterator to end
rbegin	Return reverse iterator to reverse beginning
rend	Return reverse iterator to reverse end

Thread Safety Functions

Function	Description
set_mutex	Attaches a mutex to the node
lock	Return iterator to end
unlock	Return reverse iterator to reverse beginning

Text Functions

Function	Description
JSON_TEXT	Creates a text string in the right format

JSONNode::JSONNode

explicit JSONNode(char mytype = JSON_NODE);
JSONNode(const json_string & name_t, char value_t);
JSONNode(const json_string & name_t, unsigned char value_t);
JSONNode(const json_string & name_t, short value_t);
JSONNode(const json_string & name_t, unsigned short value_t);
JSONNode(const json_string & name_t, int value_t);
JSONNode(const json_string & name_t, unsigned int value_t);
JSONNode(const json_string & name_t, long long value_t);
JSONNode(const json_string & name_t, unsigned long long value_t);
JSONNode(const json_string & name_t, long value_t);
JSONNode(const json_string & name_t, unsigned long value_t);
JSONNode(const json_string & name_t, float value_t);
JSONNode(const json_string & name_t, double value_t);
JSONNode(const json_string & name_t, long double value_t);
JSONNode(const json_string & name_t, bool value_t);
JSONNode(const json_string & name_t, const json_string & value_t);
JSONNode(const json_string & name_t, const json_char * value_t);
JSONNode(const JSONNode & orig);

Construct JSONNode

Constructs a JSONNode object, initializing it's contents depending on which constructor is used:

explicit JSONNode(char mytype = JSON_NODE);
      Default constructor: creates an empty JSONNode of the specified type.
JSONNode(const json_string & name_t, char value_t);
JSONNode(const json_string & name_t, unsigned char value_t);
JSONNode(const json_string & name_t, short value_t);
JSONNode(const json_string & name_t, unsigned short value_t);
JSONNode(const json_string & name_t, int value_t);
JSONNode(const json_string & name_t, unsigned int value_t);
JSONNode(const json_string & name_t, long value_t);
JSONNode(const json_string & name_t, unsigned long value_t);
JSONNode(const json_string & name_t, long long value_t);
JSONNode(const json_string & name_t, unsigned long long value_t);
JSONNode(const json_string & name_t, float value_t);
JSONNode(const json_string & name_t, double value_t);
JSONNode(const json_string & name_t, long double value_t);
      Constructs a numeric JSONNode.
JSONNode(const json_string & name_t, bool value_t);
      Constructs a boolean JSONNode.
JSONNode(const json_string & name_t, const json_string & value_t);
JSONNode(const json_string & name_t, const json_char * value_t);
      Constructs a string JSONNode.
JSONNode(const JSONNode & orig);
      Copy constructor, increments the reference counter, will only copy if one of them changes. To
      make a literal copy, use the duplicate method.

Option differences

JSON_REF_COUNT - if this is turned off, the copy constructor will fully duplicate the node

JSON_ISO_STRICT will remove the long long and long double variants

Parameters

mytype
>   The enumerated type of the JSONNode.

name_t
>   The name of the object

value_t
>   The value of the object

orig
>   The original JSONNode that gets copied

Complexity

>   Constant with the exception of copying a JSON_NODE or JSON_ARRAY, in which case it is
equivalent to JSONNode::duplicate.

JSONNode::~JSONNode

~JSONNode(void);

Destruct JSONNode

Destructs the JSONNode object and cleans itself up.

Option Differences

None

Parameters

None

Complexity

Depends on circumstances. If it's reference count is not one, then it's complexity is constant, if it's the sole owner of it's value, then it becomes linear on JSONNode::size, however, because JSON is a tree structure it's worse case scenario is linear on JSONNode::size + JSONNode::size of each child recursively.

JSONNode::duplicate

JSONNode duplicate(void);

Duplicating JSONNode

      Constructs a JSONNode object, by copying the contents of JSONNode. This is different from the copy constructor or assignment operator because it makes a literal copy, not reference counting.

Option Differences

None

Parameters

None

Return Value

A JSONNode that is a new copy of the original node.

Complexity

Linear on JSONNode::size, however, because JSON is a tree structure it's worse case scenario is linear on JSONNode::size + JSONNode::size of each child recursively.

JSONNode::operator =

```
void operator = (char value_t);
void operator = (unsigned char value_t);
void operator = (short value_t);
void operator = (unsigned short value_t);
void operator = (int value_t);
void operator = (unsigned int value_t);
void operator = (long long value_t);
void operator = (unsigned long long value_t);
void operator = (long value_t);
void operator = (unsigned long value_t);
void operator = (float value_t);
void operator = (double value_t);
void operator = (long double value_t);
void operator = (bool value_t);
void operator = (const json_string value_t);
void operator = (const json_char * value_t);
void operator = (const JSONNode & orig);
```

Assign JSONNode

Assigns JSONNode to a specific value and sets the type according to which version is used:

```
void operator = (char value_t);
void operator = (unsigned char value_t);
void operator = (short value_t);
void operator = (unsigned short value_t);
void operator = (int value_t);
void operator = (unsigned int value_t);
void operator = (long value_t);
void operator = (unsigned long value_t);
void operator = (long long value_t);
void operator = (unsigned long long value_t);
void operator = (float value_t);
void operator = (double value_t);
void operator = (long double value_t);
```
        Constructs a numeric JSONNode.
```
void operator = (bool value_t);
```
        Constructs a boolean JSONNode.
```
void operator = (const json_string value_t);
void operator = (const json_char * value_t);
```
        Constructs a string JSONNode.
```
void operator = (const JSONNode & orig);
```
        Copy assignment, increments the reference counter, will only copy if one of them changes. To
        make a literal copy, use the duplicate method.

Option Differences

JSON_REF_COUNT - if this is off, then the copy assignment will fully duplicate the node
JSON_ISO_STRICT will remove the long long and long double variants

Parameters

value_t
> The value of the object

orig
> The original JSONNode that gets copied

Complexity

All assignments run in constant time due to reference counting, if reference counting is not turned on, then the copy assignment is the same as duplicate.

JSONNode::operator ==

```
bool operator == (char value_t);
bool operator == (unsigned char value_t);
bool operator == (short value_t);
bool operator == (unsigned short value_t);
bool operator == (int value_t);
bool operator == (unsigned int value_t);
bool operator == (long long value_t);
bool operator == (unsigned long long value_t);
bool operator == (long value_t);
bool operator == (unsigned long value_t);
bool operator == (float value_t);
bool operator == (double value_t);
bool operator == (long double value_t);
bool operator == (bool value_t);
bool operator == (const json_string value_t);
bool operator == (const json_char * value_t);
bool operator == (const JSONNode & node);
```

Comparing JSONNode

Checks if the value held within the nodes are equal. This ignores things like comments, but for JSON_NODE and JSON_ARRAYs, this is a deep comparison, checking each child too.

Option Differences

JSON_ISO_STRICT will remove the long long and long double variants

Parameters

value_t
        The value to compare to
node
        Another node to compare to

Complexity

Constant except for JSON_NODEs and JSON_ARRAYs in which case it's linear with respect to size() and size() of each child recursively.

JSONNode::operator !=

bool operator != (char value_t);
bool operator != (unsigned char value_t);
bool operator != (short value_t);
bool operator != (unsigned short value_t);
bool operator != (int value_t);
bool operator != (unsigned int value_t);
bool operator != (long long value_t);
bool operator != (unsigned long long value_t);
bool operator != (long value_t);
bool operator != (unsigned long value_t);
bool operator != (float value_t);
bool operator != (double value_t);
bool operator != (long double value_t);
bool operator != (bool value_t);
bool operator != (const json_string value_t);
bool operator != (const json_char * value_t);
bool operator != (const JSONNode & node);

Comparing JSONNode

Checks if the value held within the nodes are not equal. This ignores things like comments, but for JSON_NODE and JSON_ARRAYs, this is a deep comparison, checking each child too.

Option Differences

JSON_ISO_STRICT will remove the long long and long double variants

Parameters

value_t
        The value to compare to
node
        Another node to compare to

Complexity

Constant except for JSON_NODEs and JSON_ARRAYs in which case it's linear with respect to size() and size() of each child recursively.

JSONNode::type

```
char type(void);
```

Return type

Returns the type of the JSONNode.

Option Differences

None

Parameters

Return Value

The type of the node.

Complexity

Constant

JSONNode::size

size_t size(void);

Return size

Returns the number of children that the node has. This should be zero for anything other than JSON_ARRAY or JSON_NODE, but this is only guaranteed with the JSON_SAFE option turned on. This is because casting may or may not purge the children.

Option Differences

None

Parameters

None

Return Value

The number of children that the node has.

Complexity

Constant.

JSONNode::empty

bool empty(void);

Return empty

Returns whether or not the node has any children. If the node is not of JSON_NODE or JSON_ARRAY it will invariably return true.

Option Differences

None

Parameters

None

Return Value

Whether or not the node is empty

Complexity

Constant.

JSONNode::name

`json_string name(void);`

Return name

Returns the name of the node. If there is no name, then it returns a blank string.

Option Differences

None

Parameters

None

Return Value

The name of the string.

Complexity

Constant.

JSONNode::get_comment

json_string get_comment(void);

Return comment

Returns the comment attached to the node

Option Differences

JSON_COMMENTS - If this option is turned off, this function is not exposed

Parameters

None

Return Value

The comment of the node

Complexity

Constant.

JSONNode::as_string

json_string as_string(void);

Return string value

Returns the string representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	"" or "null" depending on how it was created
JSON_STRING	The unescaped string value
JSON_NUMBER	The number in string form (may be in scientific notation)
JSON_BOOL	"true" or "false"
JSON_ARRAY	""
JSON_NODE	""

Notice that both JSON_NODE and JSON_ARRAY return empty strings. Use JSONNode::write and JSONNode::write_formatted to output JSON.

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_STRING

Parameters

None

Return Value

The string representation of the node.

Complexity

Constant.

JSONNode::as_int

json_int_t as_int(void);

Return int value

Returns the boolean representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	0
JSON_STRING	Undefined
JSON_NUMBER	Truncated Value
JSON_BOOL	1 if true, 0 if false
JSON_ARRAY	Undefined
JSON_NODE	Undefined

If the value is actually a floating point value, then libjson will record an error via it's callback, but will continue on ahead and simply truncate the value. So 15.9 will be returned as 15. If JSON_DEBUG is turned on, it will also error if the value of the node is outside the range of the long datatype.

Option Differences

JSON_ISO_STRICT will make this return a long
JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_NUMBER

Parameters

None

Return Value

The integer representation of the node.

Complexity

Constant.

JSONNode::as_float

json_number as_float(void);

Return floating point value

Returns the boolean representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	0.0
JSON_STRING	Undefined
JSON_NUMBER	Value
JSON_BOOL	1.0 if true, 0.0 if false
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_NUMBER

Parameters

None

Return Value

The floating point representation of the node.

Complexity

Constant.

JSONNode::as_bool
bool as_bool(void);

Return bool value

Returns the boolean representation of the node. This may be different depending on the type of the node

Function	Description
JSON_NULL	FALSE
JSON_STRING	Undefined
JSON_NUMBER	Value == 0.0
JSON_BOOL	Value
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_CASTABLE - if this option is turned on, all return values are undefined except for JSON_BOOL

Parameters

None

Return Value

The boolean representation of the node.

Complexity

Constant.

JSONNode::as_node
JSONNode as_node(void);

Return node value

Returns the node representation of the node. For anything other than node and array, it simply returns an empty node. If the caller is an array, it will convert it to a node.

Function	Description
JSON_NULL	Empty node
JSON_STRING	Empty node
JSON_NUMBER	Empty node
JSON_BOOL	Empty node
JSON_ARRAY	Array converted to a node
JSON_NODE	A copy of the node

Option Differences

None

Parameters

None

Return Value

The node representation of the node.

Complexity

Constant for all except JSON_ARRAYs and JSON_NODEs which are the same as the copy constructor.

JSONNode::as_array

JSONNode as_array(void);

Return array value

Returns the array representation of the node. For anything other than node and array, it simply returns an empty array. If the caller is an node, it will convert it to an array by stripping all of the names of each child.

Function	Description
JSON_NULL	Empty node
JSON_STRING	Empty node
JSON_NUMBER	Empty node
JSON_BOOL	Empty node
JSON_ARRAY	A copy of the array
JSON_NODE	An array of the children

Option Differences

None

Parameters

None

Return Value

The node representation of the node.

Complexity

Constant for anything other than a node. For a JSON_NODE, it is linear with respect to JSONNode::size, and JSON_ARRAY which is the same as the copy constructor

JSONNode::as_binary
std::string as_binary(void);

Return binary value

Returns the binary value that was part of this node. It returns it as a std::string, you can use the data() function to retrieve it in binary form. This allows you to use size() to know how large the binary data is.

Function	Description
JSON_NULL	Undefined
JSON_STRING	The binary data from the decoded Base64
JSON_NUMBER	Undefined
JSON_BOOL	Undefined
JSON_ARRAY	Undefined
JSON_NODE	Undefined

Option Differences

JSON_BINARY - If this option is not on, then this function is not accessible.

Parameters

None

Return Value

The Base64 decoded binary data

Complexity

Linear with respect to the length of the binary data

JSONNode::dump

JSONNode dump(void);

Dump JSONNode's internal structure

Returns a JSONNode that exposes all of the inner members of JSONNode. This is useful for debugging purposes of libjson, but not much else. It is mostly used to maintain and upgrade libjson.

Option Differences

JSON_DEBUG - If this option is not on, then this function is not accessible.

Parameters

None

Return Value

A JSONNode representation of the inner workers of the JSONNode, showing all of the members and their current state.

Complexity

Linear with respect to the size of the tree underneath the node.

JSONNode::write

json_string write(size_t approxsize = DEFAULT_APPROX_SIZE) const;

Write JSON

Returns JSON text, with no white space or comments. Designed to create JSON that is very small, and therefore, faster to send between servers or write to a disk. The flipside is that it's nearly impossible to read by human eyes.

Only root nodes (JSON_NODE and JSON_ARRAYs) are meant to be written, all others will return a blank string.

Option Differences

JSON_WRITER - If this option is not on, then this function is not accessible.

Parameters

approxsize
> The size that you want to start the buffer at. If omitted, libjson assigns a default value based on the compiling options. This is just an estimated size, libjson will extend the buffer if it needs to.

Return Value

JSON text of the node being written

Complexity

Linear with respect to the size of the tree underneath the node.

JSONNode::write_formatted

json_string write_formatted(size_t approxsize = DEFAULT_APPROX_SIZE_FORMATTED) const;

Write JSON

Returns JSON text that has been indented and prettied up so that it can be easily read and modified by humans.

Only root nodes (JSON_NODE and JSON_ARRAYs) are meant to be written, all others will return a blank string.

Option Differences

JSON_WRITER - If this option is not on, then this function is not accessible.
JSON_COMMENTS - If this option is not turned on, the no comments are written
JSON_WRITE_BASH_COMMENTS - This option will make libjson write only bash style # comments
JSON_WRITE_SINGLE_LINE_COMMENTS - This option will make libjson not write C-style /* */ comments

Parameters

approxsize
>   The size that you want to start the buffer at. If omitted, libjson assigns a default value based on the compiling options. This is just an estimated size, libjson will extend the buffer if it needs to.

Return Value

JSON text of the node being written

Complexity

Linear with respect to the size of the tree underneath the node.

JSONNode::set_name

```
void set_name(json_string name_t);
```

Setting the node's name

Sets the name of the JSONNode.

Option Differences

None

Parameters

name_t
> The name of the node

Return Value

None

Complexity

Constant

JSONNode::set_comment

void set_comment(json_string comment_t);

Setting the node's comment

Sets the comment that will be associated with the JSONNode.

Option Differences

JSON_COMMENTS - this option is required to expose this function

Parameters

comment_t
        The comment attached to the node

Return Value

None

Complexity

Constant

JSONNode::clear

void clear(void);

Clearing a node

Clears all children from the node.

Option Differences

None

Parameters

None

Return Value

None

Complexity

Linear with respect to the size of the tree underneath it

JSONNode::swap

void swap(JSONNode & other);

Swaps the contents of nodes

Swaps the contents of two nodes. This is very fast because JSONNode is just a wrapper around an internal structure, so it simply swaps pointers to those structures.

Option Differences

None

Parameters

other
        The node to swap values with

Return Value

None

Complexity

Constant

JSONNode::merge
void merge(JSONNode & other);
void merge(unsigned int num, **. . .**);

Merge the contents of nodes

It's possible that you may end up with multiple copies of the same node, through duplication and such. To save space, you might want to merge the internal reference counted structure. Obviously, this only makes a difference if reference counting is turned on.

libjson will try and do this efficiently, merging with the internal structure that has the highest reference count.

Option Differences

JSON_REF_COUNT - this option is required for this to do anything

Parameters

other
> One of the other nodes to merge with.

num
> The number of JSONNodes to merge together

. . .
> A list of JSONNode *

Return Value

None

Complexity

Constant or linear with respect to num.

JSONNode::preparse

void preparse(void);

Preparse the json

libjson's lazy parsing makes parsing JSON that is not entirely used very fast, but sometimes you want to parse it all at once, making the next reads a little faster

Option Differences

JSON_PREPARSE - this option does this automatically, so it hides this function

Parameters

None

Return Value

None

Complexity

Linear with respect to the total number of nodes in the JSON

JSONNode::set_binary

void set_binary(const unsigned char * bin, size_t bytes);

Set binary data

libjson's built in Base64 encoder will create a JSON_NODE with Base64 encoded binary data, which allows you to send images and files around. libjson's Base64 encoder is faster than most others, so it's recommended that you use this method rather than other libraries.

Option Differences

JSON_BINARY - this option is required to use this method and the Base64 method

Parameters

bin

binary data

bytes

the number of bytes that the binary data is

Return Value

None

Complexity

Linear with respect to the number of bytes

JSONNode::cast

```
void cast(char type);
```

Cast to a different type

Will change the node to a different type and do any conversions necessary.

Option Differences

None

Parameters

type
       New type of node

Return Value

None

Complexity

Constant except for casting a node to array which is linear with respect to size().

JSONNode::at

JSONNode & at(json_index_t pos) throw(std::out_of_range);
JSONNode & at(const json_string & name) throw(std::out_of_range);
const JSONNode & at(json_index_t pos) const throw(std::out_of_range);
const JSONNode & at(const json_string & name) const throw(std::out_of_range);

Getting a child

This will give you a reference to a child node either at a specific location or by it's name. This differs from the [] operator because at will throw an std::out_of_bounds exception.

Option Differences

None

Parameters

pos
        The index of the child node
name
        The name of the child node

Return Value

The child at the desired location.

Complexity

Constant for the indexed variety, linear for the named variety.

JSONNode::at_nocase

JSONNode & at_nocase(const json_string & name) throw(std::out_of_range);
const JSONNode & at_nocase(const json_string & name) const throw(std::out_of_range);

Getting a child case insensitive

This will give you a reference to a child node by it's name in a case-insensitive way.

Option Differences

JSON_CASE_INSENSITIVE_FUNCTIONS is required to use this function

Parameters

name
    The name of the child node

Return Value

The child at the desired location.

Complexity

Linear with respect to size().

JSONNode::operator []

JSONNode & operator [] (json_index_t pos);
const JSONNode & operator [] (json_index_t pos) const;
JSONNode & operator [] (const json_string & name);
const JSONNode & operator [] (const json_string & name) const;

Getting a child

This will give you a reference to a child node either at a specific location or by it's name. Asking for a node that is not there will result in undefined behavior.

Option Differences

None

Parameters

pos
        The index of the child node

name
        The name of the child node

Return Value

The child at the desired location.

Complexity

Constant for the indexed variety, linear for the named variety.

JSONNode::reserve

void reserve(json_index_t size);

Reserving space

This function reserves children space, this makes the program faster and use less memory as it doesn't have to keep allocating new memory when it runs out.

Option Differences

None

Parameters

size
    The size to reserve

Return Value

None

Complexity

If there is already some children it's linear with respect to size() unless the reserved amount is less than the current capacity, in which case it's constant. If there are no children, then it's constant.

JSONNode::push_back

void push_back(const JSONNode & node);

Adding a child

This function pushes a new child node on the back of the child list. This method copies the child, so altering the parameter later will not affect the one in the children.

Option Differences

None

Parameters

node
>   The node to be added as a child

Return Value

None

Complexity

Depends on if new memory is needed to be allocated. This function would have the same complexity as push_back for a vector plus the copy constructor. If JSON_LESS_MEMORY is defined, then this operation is always linear with respect to size(), unless reserve had been used, in which case it's constant while smaller than that reserved amount . Otherwise it is linear if the node is currently full, otherwise it's constant.

JSONNode::pop_back

JSONNode pop_back(json_index_t pos) throw(std::out_of_range);
JSONNode pop_back(const json_string & name) throw(std::out_of_range);

Getting a child

This will give remove a JSONNode from it's parent and return it to you.

Option Differences

None

Parameters

pos
        The index of the child node
name
        The name of the child node

Return Value

The child at the desired location by value.

Complexity

Linear based on size() for the variety using the name, but linear based on size() minus pos. This is because the references of the other children have to be shifted.

JSONNode::pop_back_nocase

JSONNode pop_back_nocase(const json_string & name) throw(std::out_of_range);

Getting a child

This will give remove a JSONNode from it's parent and return it to you.

Option Differences

JSON_CASE_INSENSITIVE_FUNCTIONS is required to use this function

Parameters

name
        The name of the child node

Return Value

The child at the desired location by value.

Complexity

Linear based on size().

JSONNode::find

iterator find(const json_string & name);

Getting a child

Searches through the children and finds an iterator to it. This function returns JSONNode::end() if the child does not exist.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

name
> The name of the child node

Return Value

An iterator that points to the child requested, or end() if it wasn't found.

Complexity

Linear based on size().

JSONNode::find_nocase

iterator find_nocase(const json_string & name);

Getting a child

Searches through the children and finds an iterator to it. This function returns JSONNode::end() if the child does not exist.

Option Differences

JSON_ITERATORS and JSON_CASE_INSENSITIVE_FUNCTIONS must be on to use this function

Parameters

name
      The name of the child node

Return Value

An iterator that points to the child requested, or end() if it wasn't found.

Complexity

Linear based on size().

JSONNode::erase

iterator erase(iterator pos);
iterator erase(iterator start, const iterator & end);
reverse_iterator erase(reverse_iterator pos);
reverse_iterator erase(reverse_iterator start, const reverse_iterator & end);

Removing child(ren)

iterator erase(iterator pos);
reverse_iterator erase(reverse_iterator pos);
      Erases a single child and returns the iterator to the next one.
iterator erase(iterator start, const iterator & end);
reverse_iterator erase(reverse_iterator start, const reverse_iterator & end);
      Erases a set of children, allowing for quick dumps of unneeded children.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

pos
      The position of the node that is to be deleted
start
      The position of starting node to be deleted (inclusively)
end
      The position of ending node to be deleted (inclusively)

Return Value

An iterator that points to the child after the deleted one, or end()/rend()

Complexity

Linear based on size() minus where it starts from due to memory shifting.

JSONNode::insert

iterator insert(iterator pos, const JSONNode & node);
iterator insert(iterator pos, const iterator & start, const iterator & end);
iterator insert(iterator pos, const reverse_iterator & start, const reverse_iterator & end);
iterator insert(iterator pos, const const_iterator & start, const const_iterator & end);
iterator insert(iterator pos, const const_reverse_iterator & start, const const_reverse_iterator & end);
reverse_iterator insert(reverse_iterator pos, const JSONNode & node);
reverse_iterator insert(reverse_iterator pos, const reverse_iterator & start, const reverse_iterator & end);
reverse_iterator insert(iterator pos, const iterator & start, const iterator & end);
reverse_iterator insert(reverse_iterator pos, const const_iterator & start, const const_iterator & end);
reverse_iterator insert(reverse_iterator pos, const const_reverse_iterator & start, const
const_reverse_iterator & end);

Adding child(ren)

iterator insert(iterator pos, const JSONNode & node);
 reverse_iterator insert(reverse_iterator pos, const JSONNode & node);
> These functions place a new child into your node before the node pointed to by the iterator.

iterator insert(iterator pos, const iterator & start, const iterator & end);
iterator insert(iterator pos, const reverse_iterator & start, const reverse_iterator & end);
iterator insert(iterator pos, const const_iterator & start, const const_iterator & end);
iterator insert(iterator pos, const const_reverse_iterator & start, const const_reverse_iterator & end);
reverse_iterator insert(reverse_iterator pos, const reverse_iterator & start, const reverse_iterator & end);
reverse_iterator insert(iterator pos, const iterator & start, const iterator & end);
reverse_iterator insert(reverse_iterator pos, const const_iterator & start, const const_iterator & end);
reverse_iterator insert(reverse_iterator pos, const const_reverse_iterator & start, const
const_reverse_iterator & end);
> These functions will copy a set of children from one node to another. These all start inserting at
> start and increment it until ti's end, so if you are reverse iterating, you can insert them in reverse
> order.

All of these functions copy the nodes, they remain where they are as well.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

pos
> The position to insert before

node
> The node to be inserted

start
> Position to start copying (inclusively)

end
> Position to stop copying (inclusively)

Return Value

An iterator that points to the first inserted node

Complexity

Linear based on size() minus where it starts from due to memory shifting plus end minus start for the ranged variety.

JSONNode::begin

iterator begin(void);
const_iterator begin(void) const;

Getting start of children

This function gets you an iterator pointing to the beginning of the children.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

None

Return Value

An iterator that points to the first child

Complexity

Constant

JSONNode::end

iterator end(void);
const_iterator end(void) const;

Getting end of children

This function gets you an iterator pointing past the end of the children.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

None

Return Value

An iterator that points past the last child

Complexity

Constant

JSONNode::rbegin

reverse_iterator rbegin(void);
reverse_const_iterator rbegin(void) const;

Getting start of children

This function gets you an iterator pointing to the beginning of the children in reverse order.

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

None

Return Value

An iterator that points to the first child in reverse order (actually the last child.)

Complexity

Constant

JSONNode::rend

reverse_iterator rend(void);
reverse_const_iterator rend(void) const;

Getting start of children

This function gets you an iterator pointing past the end of the children in reverse order

Option Differences

JSON_ITERATORS must be on to use this function

Parameters

None

Return Value

An iterator that points past the last child in reverse order

Complexity

Constant

JSONNode::set_mutex
void set_mutex(void * mutex);

Set a lock

This function attaches a mutual exclusion lock for the node. It can be locked and unlocked by using the lock and unlock functions, The reason for this is that because libjson's complex reference counting and internal magic, it is difficult to be sure that you track data correctly, so libjson will pass this mutex around it's internal system and track it for you.

You can pass NULL to this function to unset a mutex.

This method will filter the mutex down to all children as well, and anything that you add to it later.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function
JSON_MUTEX_MANAGER - if this option is on, then libjson will automatically delete this mutex when it
    runs out of references to it

Parameters

mutex
    A pointer to a mutex of any type (POSIX, Windows…)

Return Value

None

Complexity

Linear with size() and size() of each child recursively.

JSONNode::lock
void lock(int threadID);

Lock a mutex

      This function locks the mutex attached to a node, and locks anything sharing the lock in a different thread. The reason for the threadID parameter is that because libjson passes around structures behind the scenes it might be possible to try and lock the same lock in multiple places in the same critical section. Counting locks per thread eliminates this problem.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function

Parameters

threadID
      A unique id for this thread

Return Value

None

Complexity

Constant

JSONNode::unlock
void unlock(int threadID);

Unlock a mutex

      This function unlocks the mutex attached to a node. If the mutex has been locked multiple times by the same thread, then it will wait until all locks have been released before actually doing the unlock.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this function

Parameters

threadID
      A unique id for this thread

Return Value

None

Complexity

Constant

JSONStream

      JSONStreams allow you to have partial json or multiple json objects and alert you when the nodes are completed.

Class Functions

Function	Description
(constructor)	Construct JSONStream
(destructor)	JSONStream destructor
operator <<	Pushes data into the stream
operator =	Copy JSONStream
reset	Resets a JSONStream

JSONStream::JSONStream

JSONStream(json_stream_callback_t call_p, json_stream_e_callback_t call_e, void * id = JSONSTREAM_SELF);
JSONStream(const JSONStream & orig);

New Stream

This function creates a stream. Streams are used for pushing small amounts of json at a time, it may be incomplete json, or even multiple json nodes, and the callback you give it will be called whenever a complete node is recognized.

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

callback
    The method that gets called whenever nodes are completed
e_callback
    The method that gets called the stream encounters bad json
id
    The pointer to pass into the callback, JSONSTREAM_SELF will tell it to use itself
orig
    The stream to copy

Return Value

A new stream

Complexity

Constant

JSONStream::~JSONStream

~JSONStream(void);

Deletes stream

Deletes the stream

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

None

Return Value

None

Complexity

Constant

JSONStream::operator =

JSONStream & operator = (const JSONStream & orig);

Copies a stream

Copies a stream

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

orig
      The node to copy

Return Value

A reference to itself

Complexity

Constant

JSONStream::operator <<

JSONStream & operator << (const json_string & str);

Push to a stream

This pushes a string on the stream, and if a node gets completed, the callback gets called.

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

str
        Partial json

Return Value

A reference to itself

Complexity

Constant

JSONStream::reset

void reset(void);

Resets to a stream

Resets a stream

Option Differences

JSON_STREAM must be turned on to use this function

Parameters

Complexity

Constant

libjson

libjson is a namespace that holds a few functions that are part of libjson, but separate from JSONNode. These methods include json text functions and callback registration.

JSON Functions

Function	Description
parse	Parses json
parse_unformatted	Parse json that has no white space
strip_white_space	Removes all white space and comment
is_valid	Validates json
is_valid_unformatted	Validates json that has no whitespace
validate (deprecated)	Validate json and return the parsed node

Callback Registration

Function	Description
register_debug_callback	Registers error callback
register_mutex_callbacks	Register mutex callbacks
set_global_mutex	Set the global mutex
register_memory_callbacks	Registers the memory callbacks

Base64 Functions

Function	Description
encode64	Base64 encodes data
decode64	Decodes Base64 data

Callback Types

Function	Description
json_error_callback_t	typedef void (* json_error_callback_t)(const json_string &)
json_mutex_callback_t	typedef void (* json_mutex_callback_t)(void *)
json_malloc_t	typedef void * (* json_malloc_t)(size_t)
json_realloc_t	typedef void * (* json_realloc_t)(void *, size_t)

Function	Description
json_free_t	typedef void (* json_free_t)(void *)

libjson::parse

JSONNode parse(const json_string & json) throw(std::invalid_argument);

Parse JSON text

This function parses JSON text and returns you a JSONNode which is the root node of the text that you just passed it. If bad JSON is sent to this method it will throw a std::invalid_argument exception.

Option Differences

JSON_SAFE - a node of type JSON_NULL will be returned if the json was invalid

Parameters

json
        JSON text

Return Value

The root node of the text

Complexity

Linear depending on json.length()

libjson::parse_unformatted

JSONNode parse_unformatted(const json_string & json) throw(std::invalid_argument);

Parse JSON text

This function parses JSON text and returns you a JSONNode which is the root node of the text that you just passed it. If bad JSON is sent to this method it will throw a std::invalid_argument exception.

Option Differences

JSON_SAFE - a node of type JSON_NULL will be returned if the json was invalid

Parameters

json
JSON text

Return Value

The root node of the text

Complexity

Linear depending on json.length()

libjson::strip_white_space

json_string strip_white_space(const json_string & json);

Parse JSON text

      This function removes anything that the JSON standard defines as white space, including extra tabs, spaces, formatting, and comments. This makes this function useful for compressing json that needs to be stored or sent over a network.

Option Differences

None

Parameters

json
      JSON text

Return Value

Valid JSON that is free of all white space

Complexity

Linear depending on json.length()

libjson::is_valid

bool is_valid(const json_string & json);

Validate JSON text

This function validates the text by parsing it completely and looking for anything that is malformed.

Option Differences

JSON_VALIDATE must be on to use this feature

Parameters

json
JSON text

Return Value

true or false

Complexity

Linear depending on json.length() and the number of nodes within the text.

libjson::is_valid_unformatted
bool is_valid_unformatted(const json_string & json);

Validate JSON text

      This function validates the text by parsing it completely and looking for anything that is malformed. This is the version for json that doesn't have any white space or comments.

Option Differences

JSON_VALIDATE must be on to use this feature

Parameters

json
      JSON text

Return Value

true or false

Complexity

Linear depending on json.length() and the number of nodes within the text.

libjson::validate (deprecated)

JSONNode validate(const json_string & json);

Validate JSON text

      This function validates the text by parsing it completely and looking for anything that is malformed. If bad JSON is sent to this method it will throw a std::invalid_argument exception, otherwise it returns the root node of the text.

      This function will be removed shortly, you are advised to replace all validate calls to is_valid and parse functions.

Option Differences

JSON_VALIDATE, and JSON_DEPRECATED_FUNCTIONS must be on to use this feature

Parameters

json
      JSON text

Return Value

The root node of the text

Complexity

Linear depending on json.length() and the number of nodes within the text.

libjson::register_debug_callback
void register_debug_callback(json_error_callback_t callback);

Register error callback

This callback allows libjson to tell you exactly what is going wrong in your software, making debugging and fixing the problem much easier.

Option Differences

JSON_DEBUG must be on to use this feature

Parameters

callback
A method that must have this prototype: static void callback (const json_string & message)

Return Value

None

Complexity

Constant

libjson::register_mutex_callbacks

void register_mutex_callbacks(json_mutex_callback_t lock, json_mutex_callback_t unlock, void * manager_mutex);
void register_mutex_callbacks(json_mutex_callback_t lock, json_mutex_callback_t unlock, json_mutex_callback_t destroy, void * manager_mutex);

Register mutex callbacks

This callback allows libjson to lock mutexes that you assign to JSONNode structures. Because libjson has no idea what kind of mutex you gave it, it can't lock it without the help of a callback. This method is required to run before any locking can take place.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this feature
JSON_MUTEX_MANAGER must be on to use the second variant

Parameters

lock
> A method that locks a mutex and must have this prototype: static void callback (void * mutex).

unlock
> A method that unlocks a mutex and must have this prototype: static void callback (void * mutex).

destroy
> A method that deletes a mutex and must have this prototype: static void callback (void * mutex). This parameter is only allowed if JSON_MUTEX_MANAGER is defined, otherwise, you are responsible for cleaning up you mutexes.

manager_mutex
> A mutex that libjson will need to use to handle all of the mutexes, as even without JSON_MUTEX_MANAGER, some management takes place and libjson has a few critical sections when threading. May not be the same as the global mutex.

Return Value

None

Complexity

Constant

libjson::set_global_mutex
void set_global_mutex(void * mutex);

Register library-wide mutex

This function sets a global mutex for libjson. This is not the same as the manager mutex that you are required to register in register_mutex_callbacks. This mutex is a fallback mutex that gets locked when you attempt to lock a node that has no mutex attached to it. You may wish to omit assigning mutexes for each node and just let them all use the global one.

Option Differences

JSON_MUTEX_CALLBACKS must be on to use this feature

Parameters

mutex
        A mutex that libjson will use when it doesn't have any to use

Return Value

None

Complexity

Constant

libjson::register_memory_callbacks

void register_memory_callbacks(json_malloc_t allocer, json_realloc_t reallocer, json_free_t freer);

Register memory handling

      This function sets callbacks that libjson will use to allocate memory. This allows you to keep a tight control of memory allocation, or use things like memory pool and such. These methods are currently not allowed to return null or less than it asked for, as it will cause instability in libjson.

Option Differences

JSON_MEMORY_CALLBACKS must be on to use this feature

Parameters

allocer
      A method that must have this prototype: static void * alloc(size_t bytes)
reallocer
      A method that must have this prototype: static void * realloc(void * buffer, size_t bytes)
freer
      A method that must have this prototype: static void dealloc(void * buffer)

Return Value

None

Complexity

Constant

libjson::encode64

json_string encode64(const unsigned char * binary, json_index_t bytes);

Encodes data

This function takes binary data and does a base64 encoding so that you can send it through a text only protocol,

Option Differences

JSON_EXPOSE_BASE64 is required to use this function

Parameters

binary
binary data
bytes
the number of bytes in the binary buffer

Return Value

Base 64 encoded string

Complexity

Linear

libjson::decode64

unsigned char * decode64(const json_string & text, unsigned long * bytes);

Encodes data

       This function takes base64 encoded data and decodes it for you

Option Differences

JSON_EXPOSE_BASE64 is required to use this function

Parameters

text
       base64 encoded text
bytes
       the number of bytes in the returned binary buffer

Return Value

Decoded binary. Note: This is raw data, not a null terminated string

Complexity

Linear

# libjson::to_std_string
std::string to_std_string(const json_string & str);

Converts to STL string

This function takes a json_string and converts to it a std::string for you

Option Differences

JSON_STRING_HEADER is required to be off to use this function

Parameters

str
The string to be converted

Return Value

The string in std::string. Note that if you are in unicode mode, some information may get lost.

Complexity

Linear or 1, depending on whether or not json_string is already defined as std::string internally

libjson::to_std_wstring
std::wstring to_std_wstring(const json_string & str);

Converts to STL wstring

This function takes a json_string and converts to it a std::wstring for you

Option Differences

JSON_STRING_HEADER is required to be off to use this function

Parameters

str
The string to be converted

Return Value

The string in std::wstring.

Complexity

Linear or 1, depending on whether or not json_string is already defined as std::wstring internally

libjson::to_json_string

json_string to_json_string(const std::string & str);
json_string to_json_string(const std::wstring & str);

Converts to STL wstring

   This function takes a STL string and converts to it a json_string for you

Option Differences

JSON_STRING_HEADER is required to be off to use this function

Parameters

str
   The string to be converted

Return Value

The string in json_string. Note that if you go from unicode to non-unicode, you may loose information.

Complexity

Linear or 1, depending on whether or what json_string is defined as

JSON_TEXT

Converts text

       This is a marco that you can use to wrap around text that you pass into libjson. It automatically prepends an L in unicode mode and does nothing when not in unicode mode. This allows you to use the same code for unicode and non unicode software.

Optimizing libjson

Once your program is written and functioning with libjson, it is time to optimize it. libjson's options are the best way to do this, however if you are using a library, then you can also edit the make file and change the compiler options. Obviously you should never try to optimize with a debug build, it's doing a lot of extra checks that help debugging, but are unneeded in release.

Compiler Options

You can see the default compiler options in the building libjson section of this document. -O3 isn't always optimal, because it's such a small library, caching may actually make -Os the fastest, it depends on how much cache you have, what kind of computer, and what libjson options are turned on.

There are also many optimizations that you can do that are compiler specific. libjson does a decent amount of string functions internally, so turning on reference counted or copy on write strings may result in a performance increase, both faster due to less copying and less memory.

C++ Optimizations

If using C++, you can embed libjson and compile it into your program. This saves any time at the interface. The C interface is fairly rigid, and everything has to pass through the library interface, creating a choke-point. But in C++, many of the functions get inlined, so that little extra overhead is gone. The compiler is also free to do things like return by reference and other little tricks that you can't get with the json_ interface.

JSONOptions.h Optimizations

You can also optimize libjson by changing the options. Here are some common optimizations.

Speed

If you know that you will always be receiving proper json, or json written by your libjson engine (like if you are using it to store and read a configuration file), then JSON_SAFE is probably not needed. That option does a lot of checks to make sure that the json isn't corrupt and guards if it is. If there is no need for these guards, don't bother with them.
If you are not always sure that the json is valid, but need more parsing speed. turn JSON_SAFE off and validate the json before sending it to the parser.

The JSON_MEMORY_CALLBACKS option can help you dramatically speed up your program. libjson allocates a lot of memory using malloc, but those calls can be rerouted to callbacks, allowing you to utilize your own memory management system. A memory pool can speed up a program.

Starting with libjson 7.4.0, libjson has a built in memory pool that is shut off by default. Uncomment the JSON_MEMORY_POOL option, and if necessary, change it's starting pool size. In tests, memory pooling increased speed performance by 30%.

Starting with libjson 6.3.0, you can have libjson compile some parts of itself differently than other parts. If your program is mostly using libjson for reading, you should set JSON_READ_PRIORITY to HIGH. If you are mostly writing set JSON_WRITE_PRIORITY to HIGH. If you almost never write, turn it to LOW. This is can create some dramatically different code on certain compilers.

Memory

If JSON_STDERROR is on, libjson prints out any errors to std::cerr, which requires iostream. iostream adds considerable size to the library. Removing the JSON_STDERROR option will compile the library without iostream in it.

If you are parsing huge amounts of JSON, or are working with very limited memory and need libjson to use less of it, turn on the JSON_LESS_MEMORY option. This will cause libjson to be far more stringent with it's memory and clean it up faster. It also makes it slightly slower though because it allocates and deallocates memory more often.

Manage your own memory. Turn JSON_MEMORY_MANAGE off if you turned it on and delete your memory when you are done using it instead of just letting it sit around. libjson utilizes a map to keep track of memory, this can grow quiet a bit if not flushed often enough. Managed memory is in libjson for ease of use, not performance.

If you can bring down the size of the indexes, it may save some bytes. By turning on and changing the JSON_INDEX_TYPE option, you can choose a different type of all of the indexing. This cuts down on the size of the internal structure, but be careful, you have to give enough space to hold all of your nodes. If you are sure that no node will ever hold more than 255 subitems, you can even use an unsigned char.

You might be able to further decrease the memory required and the size of the library if you use your own string class. JSON_STRING_HEADER lets you drop in your own string class which you can heavily optimize for your needs. A string class that does reference counting, or even shallow substrings could dramatically reduce your memory usage.

Remove the JSON_CASTABLE option if you can. This option allows libjson to do conversions to do be a lot more flexible, however, if you don't ever use these conversions, or do so rarely, you may get a small memory drop if you turn it off, as it will no longer keep a string version of numbers, and bools, and nulls, and it may also significantly reduce the size of the binary.

Turn off all optional features that you are not using. The defaults in the options are meant to be flexible and easy to use, so it has a lot of functions available. For example, there are deprecated functions available in the default libjson.

Overall

If your program almost always uses most or all of the json that it receives, then doing parsing as needed might not make sense, and you might want all parsing done at once. JSON_PREPARSE will force libjson to do this. This makes the initial parse command a little slower, but every subsequent request is faster. It also drops the amount of memory libjson uses slightly.

If you turned JSON_REF_COUNT off, and can find a way to turn it back on, do it. This cuts down on both the amount of memory used when copying objects, but also saves copy time, which sometimes can be quite expensive. The common reason to turn this option off is for thread safety. It is recommended that you use the mutex callback system instead.

Write your own string class, or find a better one. There are many string classes out there that perform better than STL in some cases and are drop in and forget. Define JSON_STRING_HEADER to point to a header where you typedef your replacement string as json_string. libjson has no control over how the strings work, so you can often specialize a string type for this case. The majority of both time and memory used by libjson is spent doing string manipulation.

Benchmark your software doing both preparsing and JiT parsing. Often, if you are using all of the JSON, preparsing the JSON is both faster and uses a smaller footprint.

Roadmap

This is the roadmap of things coming down the pipeline. Bug fixes and other mistakes are always fixed as quickly as possible, but other projects that require more time, and possibly a phased rollout are jotted down here.

Pull out number parser into its own library
Create svn repository on sourceforge
Automate acceptance testing, benchmarking, and release into one step
Clean up macros in code
Replace some preprocessor with const switches or templates
Write tests for makefiles

Changelog

7.6.1

    Fixed type mismatch when memory manager is turned on
    Makefile now installs libjson for all users
    Automated release process
    Automated testing for each makefile option added
    Made benchmark link to the library, instead of compiling it in
    Fixed bug where uninstall didn't work entirely for debug mode
    Reorganized folder structure
    Automated option combo generator to test all possible combos
    Fixed compile bug when JSON_INDENT is used
    Fixed compile bug when JSON_ARRAY_SIZE_ON_ONE_LINE is used
    Fixed compile bug when JSON_NUMBER_TYPE is used
    Fixed compile bug when JSON_INT_TYPE is used
    Fixed bug where white space stripping would fail if the last quoted char is a quote
    Fixed Bug #3530505, dependancies not copied in makefile
    Fixed bug #3537672, broken vcproj
    Fixed bug #3536654, specifying std namespace for snprintf

7.6.0 (3/23/12)

    Optimized the comment extractor in preparser
    Optimized the comment extractor in worker
    Fixed JSONWorker::RemoveWhiteSpaceAndComments still throwing
    Merged white space stripper code
    Specialized white space stripper code when memory is no issue
    Unified white space stripping method signatures
    Replaced many c_str calls with data calls
    Removed extra string copy in validation
    Added JSON_NUMBER_TYPE option
    Upgraded to mempool++ 1.2
    Pulled base64 code into libbase64++ 1.1
    Fixed internally escaped strings being written in rare cases (bug #3509080)

7.5.1 (2/28/12)

    Fixed bug where FindNextRelevant can go outside string bounds

7.5.0 (2/2/12)

    Optimized writing engine to use a buffer, about 6x faster on average
    Fixed a method declaration that broke the compile in gcc 4.6.1 (bug #3436621)
    Added complete in depth unit test infrastructure to test individual functions better
    Fixed compile bugs with JSON_STRICT option
    Fixed various bugs where strange number formats would be read wrong
    Fixed inconsistencies with number parsers
    Added tests for JSON_STRICT
    Fixed accident where JSON_LIBRARY was off

Make one of most common methods template based when size doesn't matter
Added some extra caches to speed up big writes
Removed throw from JSONWorker to allow no exceptions
Fixed possible stack overflow problem with streams (bug #3452923)
Added the JSON_SECURITY_MAX_STREAM_OBJECTS option
Added optional parameters to writes for buffer size
Removed unused method in writer
Put in place infrastructure for shared strings (not implemented yet)
Fixed bug where assert for negative allocations wasn't getting called
7.4.1 (10/13/11)
Fixed accident where JSON_MEMORY_CALLBACKS was turned on
Added libjson::to_std_string and libjson::to_std_wstring methods
Added libjson::to_json_string method
7.4.0 (9/6/11)
Added mempool++ inside of the libjson code for nodes, internal nodes, and stl
Tests with memory pooling run about 30% faster
Added JSON_MEMORY_POOL option
7.3.4 (9/1/11)
Fixed bug where with JSON_NULL_MEMORY option could null out children
Explicitly defined std namespace for memory functions
7.3.3 (8/25/11)
Fixed problem with as_int being limited to long
7.3.2 (8/15/11)
Made library fail compilation if JSON_NO_EXCEPTIONS and JSON_SAFE on
7.3.1 (8/1/11)
Fixed makefile
7.3.0 (7/28/11)
Moved all globals to one place
Globals now allocated only when needed by using singletons
Fixed some incorrect error reporting
Moved most repeated strings in global strings
Fixed bug with base64 not null terminating (bug #3370505)
Put hotspots in allocator
Made allocator VC++ capable
Fixed bug in preparser with escaped strings
Fixed bug in writer where unparsed dumps may have intermediate values
Added error detection in streams
Added option to have streams use themselves as identifiers
Added a state to streams
Test Suite now shows the maximum amount of heap used at once
7.2.0 (7/15/11)
Changed the default options to make library bigger by default
Added the JSON_CASTABLE option
Added the JSON_SECURITY_MAX_NEST_LEVEL option
Added the JSON_SECURITY_MAX_STRING_LENGTH option
Fixed a bug where json_encode64 would not produce a correct string

Added a 2nd parameter to the stream callbacks
Made all dynamic allocations do through callbacks (even STL)
Made writer more memory efficient
Fixed unicode verification bug
Added a secondary parser (preprocessor swaps them)
Fixed some implicit conversions between unicode and ascii
Replaced some global callbacks with singletons
7.1.1 (3/3/11)
Fixed an implicit conversion between unicode and ascii
Removed some compiler warnings from VC++
Added checks for LONG_LONG_MAX and LLONG_MAX
7.1.0 (3/1/11)
Added the ARRAY_SIZE_ON_ONE_LINE option
Added JSON_INT_TYPE option
Fixed bug in validation in unicode mode
Fixed bug where huge numbers wouldn't be translated correctly
Fixed a bug where precision was lost in base 64 unicode encoding
Make number parsing safer for unicode
Fixed the long long and long double variants not being declared
Added the -> operator to iterators
Added casts from iterators to const_iterators
Added casts from reverse_iterators to reverse_const_iterators
Added comparison ability between iterators and const_iterators
Added comparison ability between reverse_iterators and reverse_const_iterators
Made write and write_formatted const
7.0.1 (2/17/11)
Bernhard Fluehmann fixed a bug in the makefile
7.0.0 (2/02/11)
Added JSON_STRICT option
Made checking of numeric values more precise
Expanded some test macros
Replaced some implicit initializations with explicit ones
Replaced FromOctal with one big conversion
Made number converters more explicit
Removed // comments from C interface
Added exception specification
Added various GCC-specific optimizations
        Made a few methods __attribute__ ((pure))
        Made a few fields __attribute__ ((packed)) with JSON_LESS_MEMORY
        Packed data even tighter in JSON_LESS_MEMORY mode
        Added hot and cold spots depending on options
        Added compile-time branch prediction
Added various VC++-specific optimizations
        Packed data even tighter in JSON_LESS_MEMORY mode
Made _ftoa not a template function
Changed JSON_WRITER option to JSON_WRITE_PRIORITY

Added JSON_READ_PRIORITY
Added __LIBJSON_MAJOR__
Added __LIBJSON_MINOR__
Added __LIBJSON_PATCH__
Added __LIBJSON_VERSION__
With JSON_LESS_MEMORY on, number conversion buffers are on the heap
Number to string conversions much faster now
String to number in JSON_STRICT mode really fast
Sped up string manipulation
Allowed reserve with JSON_LESS_MEMORY again
Added NDEBUG to release build options
Rewrote how validation is done
Made entire reading engine much faster in most cases
Constants (true, false, null) can now be case-insensitive
Added JSON_OCTAL option
Added JSONStreams
Added JSON_EXPOSE_BASE64 option
Nodes that aren't containers use considerably less memory
Fixed a bug where mutexes wouldn't propagate during a copy
Added JSON_NO_EXCEPTIONS option
Added JSON_DEPRECATED_FUNCTIONS option
Replaced makefile with one written by Bernhard Fluehmann
6.2.3 (12/10/10)
Any unsupported escape character is put in as-is
Removed escaping of vertical tabs when writing
6.2.2 (12/9/10)
Fix bug where single quotes got escaped
6.2.1 (11/23/10)
Fix a few documentation slips
Fixed bug in All Test Suite options
Defined as_int and as_float for strings
reserve now is a no-op when JSON_LESS_MEMORY is on
Added JSON_BOOL_TYPE option for the C interface
6.2.0 (11/18/10)
Fix problem with escaping names sometimes
Added JSON_ESCAPE_WRITES option to make escaping special chars optional
Added JSON_STRING_HEADER option to drop in custom string classes
Added JSON_NO_C_CONSTS option
Memory enhancements throughout
Added Salvor Hardin's fix for missing snprintf in VC++
Added C++ example in the Getting Started folder
6.1.2 (11/11/10)
Fixed bug where unicode wasn't writing escaped UTF correctly
Added JSON_TEXT macro to the documentation
6.1.1 (11/10/10)
Fixed bug with consecutive surrogate pairs not being read correctly

Changed license to FreeBSD

6.1.0 (10/16/10)
Made buffers for converting numbers to strings solved at compile time
Minor performance tweaks throughout
Better examples thanks to Chris Larsen
Fixed a few mistakes in documentation

6.0.0 (9/11/10)
Complete rewrite of library
More STL-like C++ interface
More standard C interface
Must faster
Less Memory
Must more customizable
Huge Test Suite
Complete cplusplus.com-like documentation

5.2.4 (8/24/10)
Added memory cleanup in example.cpp

5.2.3 (8/24/10)
Fixed safety catch in mismatched quotes

5.2.2 (8/20/10)
Added safety catch for mismatched quotes

5.2.1 (8/6/10)
Fixed bug 3040432 (not mallocing enough memory in white space stripper)

5.2 (7/7/10)
Changed some size_t to unsigned ints for uniformity
Made some functions faster
Fixed problem with key/value pairs being accepted in arrays
Fixed problem where DEBUG mode would give false Children errors
Fixed compiling error under Linux

5.1 (7/6/10)
Fixed bug where duplication arrays or nodes wouldn't work
Added JSON_LESS_MEMORY compiling option
Replaced std::vector with custom container

5.0 (6/27/10)
Added a JSON_SAFE compiling option
Added JSON_PREPARSE compiling option
Fixed bug with name_encoded flag not dumping correctly
Nodes now use 5% - 20% less memory

4.5 (6/18/10)
Made unicode slightly more efficient
Fixed some documentation
Added GetMemoryUsage method to debugger
Nodes now use 8% less memory

4.4 (6/17/10)
Fixed bug where false values were not always flagged as Fetched
Fixed typecast when converting double to int

Used a union for boolean and double values for smaller memory footprint

4.3 (6/16/10)

new makefiles for each platform

Removed unused declarations

4.2 (5/7/10)

Fixed makefile

Removed unused declarations

4.1 (5/5/10)

Full support for surrogate pairs

makefile for linux

Better documentation

4.0 (4/21/10)

Numbers now get fetched lazily too

Added full unicode support by adding a JSON_UNICODE compile option

Added unicode targets in Code::Blocks projects

Prebuilt libraries / suites now not included to make downloads faster

3.0 (4/20/10)

Fixed bug with Root Arrays printing an extra comma

Root arrays now also lazily fetched

Unified array parsing routine

Decent speed and memory optimizations

NodeAsFloat now returns a double, not a single

Replaced profiler with Dump method

Dump now uses allocated string space instead of length

Added Preparse function

Made header safeties more obscure to not interfere with other headers

2.2 (4/18/10)

More technical documentation

More speed in initial parsing

Added profiler and raw memory dumps to Debug version

2.1 (4/15/10)

Added support for escaping object names

Added support for bash-style comments

Made writing strings without escaping faster

Made initial parse faster and uses less memory

2.0 (4/7/10)

Added support for Octal string escaping

Added support for both single and multiline C-style comments

1.0 (4/1/10)

Initial release

Renamed LiveJSON to libjson and added Test Suites

License

This license is also available in license.txt