

# log4cplus README





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### 1 Short Description

[log4cplus](#) is a simple to use C++ logging API providing thread-safe, flexible, and arbitrarily granular control over log management and configuration. It is modeled after the Java log4j API.

### 2 Latest Project Information

The latest up-to-date information for this project can be found at [log4cplus](#) SourceForge project pages or [log4cplus wiki](#) on SourceForge. Please submit bugs, patches, feature requests, etc., there.

### 3 Mission statement

The aim of this project is to develop log4j-like logging framework for use in (primarily) C++. One of the major design goals is to avoid huge dependencies (like Boost) in the core functionality and to use standard C++ facilities instead. Where possible, the project takes inspiration from other logging libraries, beside from log4j (e.g., from log4net, log4cxx, log4cpp).

### 4 Platform support

Log4cplus has been ported to and tested on the following platforms:

- Linux/AMD64 with 4.8.1 (Ubuntu/Linaro 4.8.1-10ubuntu8)
- Linux/AMD64 with Sun C++ 5.12 Linux\_i386 2011/11/16
- Linux/AMD64 with Clang version 3.2-1~exp9ubuntu1 (tags/RELEASE\_32/final) (based on LLVM 3.2)
- Linux/AMD64 with Intel(R) C++ Intel(R) 64 Compiler XE for applications running on Intel(R) 64, Version 12.1 Build 20120410
- FreeBSD/AMD64 with GCC 3.4.6, 4.2.1 and 4.3.3
- Windows 7 with MS Visual Studio 2010 and 2012
- OpenSolaris 5.11/i386 with Sun C++ 5.10 SunOS\_i386 128229-02 2009/09/21, with `-l library=stlport4`
- Solaris 5.10/Sparc with Sun C++ 5.8 2005/10/13, with `-l library=stlport4` and with `-l library=Cstd`.
- Solaris 5.10/Sparc with GCC 3.4.3 (cs1-sol210-3\_4-branch+sol\_rpath)
- NetBSD 6.0/AMD64 with GCC 4.5.3 (NetBSD nb2 20110806)



- OpenBSD 5.2/AMD64 with GCC 4.2.1 20070719
- MacOS X 10.8 with GCC 4.2.1 (Apple Inc. build 5664)
- MacOS X 11.4.2 with GCC 4.2.1 (Based on Apple Inc. build 5658) (LLVM build 2336.11.00)
- HP-UX B.11.11 with HP ANSI C++ B3910B A.03.80 (hppa2.0w-hp-hpux11.11)
- Haiku R1 Alpha 4.1 with GCC 4.6.3
- AIX 5.3 with IBM XL C/C++ for AIX, V11.1 (5724-X13)

The testing on the above listed platforms has been done at some point in time with some version of source. Continuous testing is done only on Linux platform offered by [Travis CI](#) service.

## 5 Configure script options

### 5.1 --enable-debugging

This option is disabled by default. This option mainly affects GCC builds but it also has some limited effect on non-GCC builds. It turns on debugging information generation, undefines NDEBUG symbol and adds -fstack-check (GCC).

### 5.2 --enable-warnings

This option is enabled by default. It adds platform / compiler dependent warning options to compiler command line.

### 5.3 --enable-so-version

This option is enabled by default. It enables SO version decoration on resulting library file, e.g., the .2.0.0 in liblog4cplus-1.2.so.2.0.0.

### 5.4 --enable-release-version

This option is enabled by default. It enables release version decoration on the resulting library file, e.g., the -1.2 in liblog4cplus-1.2.so.2.0.0.

### 5.5 --enable-symbols-visibility-options

This option is enabled by default. It enables use of compiler and platform specific option for symbols visibility. See also the [Visibility](#) page on GCC Wiki.



### 5.6 `--enable-profiling`

This option is disabled by default. This option adds profiling information generation compiler option `-pg` to GCC and Sun CC / Solaris Studio builds.

### 5.7 `--enable-threads`

This option is enabled by default. It turns on detection of necessary compiler and linker flags that enable POSIX threading support.

While this detection usually works well, some platforms still need help with configuration by supplying additional flags to the configure script. One of the known deficiencies is Solaris Studio on Linux. See one of the later notes for details.

### 5.8 `--with-working-locale`

This is one of three locale and `wchar_t`↔`char` conversion related options. It is disabled by default.

It is known to work well with GCC on Linux. Other platforms generally have lesser locale support in their implementations of the C++ standard library. It is known not to work well on any BSDs.

See also `docs/unicode.txt`.

### 5.9 `--with-working-c-locale`

This is second of `wchar_t`↔`char` conversion related options. It is disabled by default.

It is known to work well on most Unix-like platforms, including recent Cygwin.

### 5.10 `--with-iconv`

This is third of `wchar_t`↔`char` conversion related options. It is disabled by default.

The conversion using `iconv()` function always uses `"UTF-8"` and `"WCHAR_T"` as source/target encoding. It is known to work well on platforms with GNU `iconv`. Different implementations of `iconv()` might not support `"WCHAR_T"` encoding selector.

Either system provided `iconv()` or library provided `libiconv()` are detected and accepted. Also both SUSv3 and GNU `iconv()` function signatures are accepted.

### 5.11 `--with-qt`

This option is disabled by default. It enables compilation of a separate shared library (`liblog4cplusqt4debugappender`) that implements `Qt4DebugAppender`. It requires Qt4 and `pkg-config` to be installed.



## 6 Notes

### 6.1 Compilation

On Unix-like platforms, [log4cplus](#) can be compiled using either autotools based build system or using CMake build system. The autotools based build system is considered to be primary for Unix-like platforms.

On Windows, the primary build system is Visual Studio 2010 solution and projects (msvc10/ ↵ log4cplus.sln). This solution and associated project files should update just fine to Visual Studio 2012 out of the box. See also scripts/msvc10\_to\_msvc11.cmd and scripts/msvc10\_to\_msvc12. ↵ cmd helper scripts that create msvc11/log4cplus.sln and msvc12/log4cplus.sln respectively when invoked on msvc10/log4cplus.sln from source root directory.

MinGW is supported by autotools based build system. CMake build system is supported as well and it should be used to compile [log4cplus](#) with older versions of Visual Studio or with less common compiler suites (e.g., Embarcadero, Code::Blocks, etc.).

### 6.2 Cygwin/MinGW

Some version of GCC (3.4.x and probably some of 4.x series too) on Windows (both MinGW and Cygwin) produces lots of warnings of the form:

```
1 warning: inline function 'void foo()' is declared as dllimport: attribute ignored
```

This can be worked around by adding `-Wno-attributes` option to GCC command. Unfortunately, not all affected version of GCC have this option.

### 6.3 MinGW and MSVCRT version

[log4cplus](#) can use functions like `_vsnprintf_s()` (Microsoft's secure version of `vsnprintf()` ↵ ). MinGW tool-chains (by default) link to the system `MSVCRT.DLL`. Unfortunately, older systems, like Windows XP, ship with `MSVCRT.DLL` that lacks these functions. It is possible to compile [log4cplus](#) with MinGW tool-chains but *without* using Microsoft's secure functions by defining `__MSVCRT_VERSION__` to value less than `0x900` and vice versa.

```
1 $ ../configure CPPFLAGS="-D__MSVCRT_VERSION__=0x700"
```

### 6.4 Windows and TLS

[log4cplus](#) uses thread-local storage (TLS) for NDC, MDC and to optimize use of some temporary objects. On Windows there are two ways to get TLS:



1. using `TlsAlloc()`, etc., functions
2. using `__declspec(thread)`

While method (2) generates faster code, it has [some limitations prior to Windows Vista](#). If `log4cplus.dll` is loaded at run time using `LoadLibrary()` (or as a dependency of such loaded library), then accessing `__declspec(thread)` variables can cause general protection fault (GPF) errors. This is because Windows prior to Windows Vista do not extend the TLS for libraries loaded at run time using `LoadLibrary()`. To allow using the best available method, [log4cplus](#) enables the method (2) by checking `_WIN32_WINNT >= 0x0600` condition, when compiling [log4cplus](#) targeted to Windows Vista or later.

## 6.5 Android, TLS and CMake

[log4cplus](#) uses thread-local storage (TLS, see “Windows and TLS” for details). On the Android platform, when [log4cplus](#) is being compiled using the `android/android.toolchain.cmake`, you might get errors featuring the `__emutls` symbol:

```
1 global-init.cxx:268:46: error: log4cplus::internal::__emutls_t.↵  
    _ZN9log4cplus8internal3ptdE causes a section type conflict with log4cplus::↵  
    internal::ptd
```

To work around this issue, invoke CMake with `-DANDROID_FUNCTION_LEVEL_LINKING:BOOL=OFF` option.

## 6.6 Threads and signals

[log4cplus](#) is not safe to be used from asynchronous signals' handlers. This is a property of most threaded programmes in general. If you are going to use [log4cplus](#) in threaded application and if you want to use [log4cplus](#) from signal handlers then your only option is to block signals in all threads but one that will handle all signals. On POSIX platforms, this is possible using the `sigwait()` call. [log4cplus](#) enables this approach by blocking all signals in any threads created through its threads helpers.

## 6.7 IBM's XL C/C++ compiler

IBM's XL C/C++ compiler executable has [many variants](#). To compile [log4cplus](#) with threading support specify one of the compiler variants that support threading using the `CXX` variable on configure script command line. E.g.:

```
1 $ ../configure --enable-threads CXX=xlC_r
```





## 6.8 AIX reentrancy problem

There appears to be a reentrancy problem with AIX 5.3 and xLC 8 which can result into a deadlock condition in some circumstances. It is unknown whether the problem manifests with other versions of either the OS or the compiler, too. The problem was initially reported in a bug report [#103](#).

The core of the problem is that IBM's/xLC's standard C++ IOSTreams implementation uses global non recursive lock to protect some of its state. The application in the bug report was trying to do logging using [log4cplus](#) from inside `overflow()` member function of a class derived from `std::streambuf` class. [log4cplus](#) itself uses `std::ostringstream`. This resulted into an attempt to recursively lock the global non recursive lock and a deadlock.

## 6.9 Solaris / SunOS

Some older version of this operating system might have problems linking [log4cplus](#) due to [missing `\_\_tls\_get\_addr`](#) in their unpatched state.

## 6.10 Solaris Studio

Solaris Studio compilers' default standard C++ library is very non-standard. It seems that it is not conforming enough in, e.g., Sun C++ 5.12 Linux\_i386 2011/11/16 (missing `std::time_t`, etc.), but it works well enough on Solaris with Sun C++ 5.8 2005/10/13. Thus [log4cplus](#) adds `-library=stlport4` to the `CXXFLAGS` environment variable, unless a switch matching `-library=(✓ stlport4|stdcxx4|Cstd)` is already present there. If you want to override the default supplied by [log4cplus](#), just set it into `CXXFLAGS` on configure script command line.

Solaris Studio supports the `__func__` symbol which can be used by [log4cplus](#) to record function name in logged events. To enable this feature, add `-features=extensions` switch to `CXXFLAGS` for configure script. Subsequently, you will have to add this switch to your application's build flags as well.

## 6.11 Solaris Studio on GNU/Linux

The autotools and our `configure.ac` combo does not handle Solaris Studio compiler on Linux well enough and needs a little help with configuration of POSIX threads:

```
1 $ COMMON_FLAGS="-L/lib/x86_64-linux-gnu/ \  
2 -L/usr/lib/x86_64-linux-gnu/ -mt=yes -O"  
3  
4 $ ../configure --enable-threads=yes \  
5 CC=/opt/solarisstudio12.3/bin/cc \  
6 CXX=/opt/solarisstudio12.3/bin/CC \  
7 CFLAGS="$COMMON_FLAGS" \  
8 CXXFLAGS="$COMMON_FLAGS" \  
9
```



```
9 LDFLAGS="-lpthread"
```

## 6.12 HP-UX with aCC

It is necessary to turn on C++98 mode of aCC by providing the -AA flag:

```
1 $ ../configure --enable-threads=yes CXXFLAGS="-AA"
```

## 6.13 HP-UX with aCC on IA64

There is a problem on IA64 HP-UX with aCC (HP C/aC++ B3910B A.06.20). The problem manifests as [unsatisfied symbols during linking of loggingserver](#):

```
1 ld: Unsatisfied symbol "virtual table of loggingserver::ClientThread" in file ↵  
   loggingserver.o
```

The problem appears to be a deficiency in aCC and its support of `__declspec(dllexport)`. To work around this issue, add `--disable-symbols-visibility-options` to configure script command line:

```
1 $ ../configure --disable-symbols-visibility-options \  
2 --enable-threads=yes CXXFLAGS="-AA"
```

## 6.14 Haiku

Haiku is supported with GCC 4+. The default GCC version in Haiku is set to version 2 (based on GCC 2.95.x). To change the default GCC version to version 4, please run `setgcc gcc4` command. This is to avoid linking errors like this:

```
1 main.cpp:(.text.startup+0x54a): undefined reference to `__Unwind_Resume'
```

Running the command switches the *current* GCC version to version 4. This change is permanent and global. See also Haiku ticket [#8368](#).

## 6.15 Qt4 / Win32 / MSVC

In order to use [log4cplus](#) in Qt4 programs it is necessary to set following option: Treat `WChar_t` ↵  
As Built in Type: No (/Zc:wchar\_t-)

Set this option for [log4cplus](#) project and Qt4DebugAppender project in MS Visual Studio. Remember to use Unicode versions of [log4cplus](#) libraries with Qt. It is also necessary to make clear distinction between debug and release builds of Qt project and [log4cplus](#). Do not use [log4cplus](#) release library with debug version of Qt program and vice versa.



For registering Qt4DebugAppender library at runtime, call this function: `log4cplus::Qt4DebugAppender::registerAppender()`

Add these lines to qmake project file for using [log4cplus](#) and Qt4DebugAppender:

```
1 INCLUDEPATH += C:\log4cplus\include
2 win32 {
3     CONFIG(debug, debug|release) {
4         LIBS += -LC:\log4cplus\msvc10\Win32\bin.Debug_Unicode -llog4cplusUD
5         LIBS += -LC:\log4cplus\msvc10\Win32\bin.Debug_Unicode -llog4cplus-
6             Qt4DebugAppender
7     } else {
8         LIBS += -LC:\log4cplus\msvc10\Win32\bin.Release_Unicode -llog4cplusU
9         LIBS += -LC:\log4cplus\msvc10\Win32\bin.Release_Unicode -llog4cplus-
10             Qt4DebugAppender
11     }
12 }
```

## 6.16 Qt/GCC

You might encounter the following error during compilation with `--with-qt` option:

```
1 qglobal.h:943: error: ISO C++ does not support 'long long'
```

This is caused by `-pedantic` option that [log4cplus](#) adds to `CXXFLAGS` when compiling with GCC. To work around this issue, add `-Wno-long-long` GCC option to `CXXFLAGS`.

## 6.17 OpenBSD

OpenBSD 5.2 and earlier have a bug in `wcsftime()` function in handling of `%%` and `%N` where `N` is not a supported formatter. This is fixed in OpenBSD 5.3 and later. This shows as failing `timeformat_test` when [log4cplus](#) is compiled with `-DUNICODE` in `CXXFLAGS`.

## 6.18 LOG4CPLUS\*\_FMT() and UNICODE

Beware, the `%s` specifier does not work the same way on Unix-like platforms as it does on Windows with Visual Studio. With Visual Studio the `%s` specifier changes its meaning conveniently by printing `wchar_t` string when used with `wprintf()` and char strings when used with `printf()`. On the other hand, Unix-like platforms keeps the meaning of printing char strings when used with both `wprintf()` and `printf()`. It is necessary to use `%ls` (C99) specifier or `%S` (SUSv2) specifier to print `wchar_t` strings on Unix-like platforms.

The common ground for both platforms appears to be use of `%ls` and `wchar_t` string to print strings with unmodified formatting string argument on both Unix-like platforms and Windows. The conversion of `wchar_t` back to char then depends on C locale.



## 6.19 C++11 support

[log4cplus](#) contains small amount of code that uses C++11 (ISO/IEC 14882:2011 standard) language features. C++11 features are used only if C++11 support is detected during compile time. Compiling [log4cplus](#) with C++11 compiler and standard library and using it with C++03 (ISO/IEC 14882:2003 standard) application is not supported.

## 6.20 Unsupported compilers

[log4cplus](#) does not support too old or broken C++ compilers:

- Visual C++ prior to 7.1
- GCC prior to 3.2
- Older versions of Borland/CodeGear/Embarcadero C++ compilers

## 6.21 Unsupported platforms

[log4cplus](#) requires some minimal set of C and/or C++ library functions. Some systems/platforms fail to provide these functions and thus [log4cplus](#) cannot be supported there:

- Windows CE – missing implementations of `<time.h>` functions

## 7 License

This library is licensed under the Apache Public License 2.0 and two clause BSD license. Please read the included LICENSE file for details.

## 8 Contributions

[log4cplus](#) (bug tracker, files, wiki) is hosted on SourceForge, except for [log4cplus source](#), which is hosted on Github. This allows the project to integrate with [Travis CI](#) service offered by Github.

### 8.1 Patches

Anybody can contribute to [log4cplus](#) development. If you are contributing a source code change, use a reasonable form: a merge request of a Git branch or a patch file attached to a ticket in [Bugs tracker](#) or sent to [log4cplus-devel mailing list](#). Unless it is obvious, always state what branch or release tarball is your patch based upon.



## 8.2 Formatting

Please use common sense. Follow the style of surrounding code. You can use the following Emacs style that is based on Microsoft's style as a guide line:

```
1 ;; Custom MS like indentation style.
2 (c-add-style "microsoft"
3             '("stroustrup"
4               (c-offsets-alist
5                 (innamespace . -)
6                 (inline-open . 0)
7                 (inher-cont . c-lineup-multi-inher)
8                 (arglist-cont-nonempty . +)
9                 (template-args-cont . +))))
```

## 9 UNICODE

Log4cplus uses the expression "UNICODE" in at least two not so equal meanings:

1. the [Unicode](#) standard as defined by the Unicode Consortium
2. compiler's and/or C++ standard library's support for strings of `wchar_t`s and their manipulation

### 9.1 `wchar_t` support

Log4cplus is aimed to be portable and to have as little 3rd party dependencies as possible. To fulfill this goal it has to use facilities offered by the operating systems and standard libraries it runs on. To offer the best possible level of support of national character, it has to support usage of `wchar_t` and it has to use `wchar_t` support (especially on Windows) provided by operating system and standard C and C++ libraries.

This approach to portability has some limitations. One of the limitations is lacking support for C++ locales in various operating systems and standard C++ libraries. Some standard C++ libraries do not support other than the "C" and "POSIX" locales. This usually means that `wchar_t`↔`char` conversion using `std::codecvt<>facet` is impossible. On such deficient platforms, log4cplus can use either standard C locale support or `iconv()` (through `libiconv` or built-in).

### 9.2 Unicode and file appenders

Another limitation related to Unicode support is then inability to write `wchar_t` messages that contain national characters that do not map to any code point in single byte code page to log files



using `FileAppender`. This is a problem mainly on Windows. Linux and other Unix-like systems can avoid it because they do not need to use `wchar_t` interfaces to have Unicode aware applications. They usually (as of year 2012) use UTF-8 based locales. With proper C++ locale setup in client applications, national characters can come through into log files unharmed. But if they choose to use `wchar_t` strings, they face the problem as well.

### 9.3 Unix-like platforms

To support output of non-ASCII characters in `wchar_t` message on Unix-like platforms, it is necessary to use UTF-8 based locale (e.g., `en_US.UTF-8`) and to set up global locale with `std::codecvt<>facet` or imbue individual `FileAppenders` with that facet. The following code can be used to get such `std::locale` instance and to set it into global locale:

```
1 std::locale::global (    // set global locale
2     std::locale (        // using std::locale constructed from
3         std::locale (),   // global locale
4         // and codecvt facet from user locale
5         new std::codecvt_byname<wchar_t, char, std::mbstate_t>(""));
```

### 9.4 Windows

Windows do not support UTF-8 based locales. The above approach will yield a `std::locale` instance converting `wchar_t`s to current process' code page. Such locale will not be able to convert Unicode code points outside the process' code page. This is true at least with the `std::codecvt` facet implemented in Visual Studio 2010. Instead, with Visual Studio 2010 and later, it is possible to use `std::codecvt_utf8` facet:

```
1 std::locale::global (    // set global locale
2     std::locale (        // using std::locale constructed from
3         std::locale (),   // global locale
4         // and codecvt_utf8 facet
5         new std::codecvt_utf8<tchar, 0x10FFFF,
6             static_cast<std::codecvt_mode>(std::consume_header
7             | std::little_endian)>));
```

## 10 Release Procedure

This describes log4cplus release procedure:

1. Update `ChangeLog` file with worthy changes.



2. Make sure that version information in `version.h` and `configure.ac` is up to date. Run `scripts/propagate-version.sh` followed by `scripts/doautoreconf.sh`. *Do not forget to commit the changes.*
3. Run `scripts/prepare_dist_from_git.sh` to prepare tarballs.
4. Upload tarballs to SourceForge.
5. Send announcement to [log4cplus-devel@lists.sourceforge.net](mailto:log4cplus-devel@lists.sourceforge.net).
6. Tag revision on branch.
7. Write news entry to SourceForge.
8. Use Pandoc with parameters `--smart --standalone -f markdown -t markdown_strict+  
hard_line_breaks-intraword_underscores` to generate a version of README file with Mark-  
down compatible with SourceForge's wiki. Upload resulting file to project's SourceForge  
wiki page using the `scripts/upload_to_wiki.pl` script.
9. Post release information to [G+ log4cplus page](#) and share it with the [log4cplus community](#).

## 11 Contributors

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