

GNU C Library NEWS -- history of user-visible changes. 2005-10-22
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Please send GNU C library bug reports via [<http://sources.redhat.com/bugzilla/>](http://sources.redhat.com/bugzilla/)
using 'glibc' in the "product" field.

Version 2.3.6

* The following bugs are resolved with this release:

38, 253, 549, 622, 653, 721, 758, 851, 877, 915, 934, 955, 961,
1016, 1037, 1076, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086,
1087, 1088, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098,
1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109,
1110, 1111, 1112, 1113, 1125, 1137, 1138, 1249, 1250, 1251, 1252,
1253, 1254, 1350, 1358, 1394, 1438, 1498, 1534

Visit [<http://sources.redhat.com/bugzilla/>](http://sources.redhat.com/bugzilla/) for the details of each bug.

* As of this release, GCC 4 can be used to compile the C Library.

* Timezone data updated to 2005m version.

Version 2.3.5

* The following bugs are resolved with this release:

284, 592, 602, 626, 633, 640, 650, 661, 671, 681, 693, 700, 710, 719,
722, 723, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736,
737, 738, 739, 740, 741, 742, 743, 744, 745, 765, 767, 768, 769, 776,
777, 787, 821, 822, 823, 825

Visit [<http://sources.redhat.com/bugzilla/>](http://sources.redhat.com/bugzilla/) for the details of each bug.

Version 2.3.4

* Support for RFC 3678. Real implementations exist only for Linux so far.
Implemented by Ulrich Drepper.

* nscd can now cache entries persistently. Expiring entries are reloaded.
For speedups the cache can be shared in memory with client processes.
Implemented by Ulrich Drepper.

* nscd can now perform SELinux checks.
Implemented by Matthew Rickard [<mjricka@epoch.ncsc.mil>](mailto:mjricka@epoch.ncsc.mil).

* getaddrinfo queries are now cached. Canonical name lookup is performed
efficiently.
Implemented by Ulrich Drepper.

* The nothrow function attribute is used when headers are used by gcc when
compiling C code. This can avoid significant amounts of exception
handling data.

* The malloc functions perform more error checking and are stricter when
it comes to reacting on errors. The default action is to terminate
the process after showing an error message. Implemented by Ulrich Drepper.

* Reverse lookups of IPv6 addresses does not use bit string or .ip6.int

lookups anymore unless explicitly requested. Implemented by Ulrich Drepper.

- * Namespaces in ld.so are implemented. DSOs can be loaded in separate namespaces using the new function `dlopen()`. This feature is of course, like most other dynamic loading functionality, not available in statically linked applications. Implemented by Ulrich Drepper.
- * Low-overhead boundary checking variants of `string` and some `stdio` functions were added. These are to be used in conjunction with a `gcc` patch by Jakub Jelinek which adds calls to these functions if possible. Implemented by Jakub Jelinek and Ulrich Drepper.
- * Old code for several operating systems and machine architectures that have not been in working condition in a long time have been removed from the main source tree maintained by the GNU C Library's maintainers. These files are now reside in the separate 'ports' source module that is usable as an add-on when building the library.

Version 2.3.3

- * New functions `'dladdr1'` and `'dlinfo'` in `<dlfcn.h>` provide more ways to interrogate the dynamic linker, compatible with the Solaris interface.
- * ELF thread-local storage support (TLS) now works on PowerPC and PowerPC64; implemented by Paul Mackerras, Steven Munroe, and Roland McGrath.
- * `getifaddrs` now uses the `netlink` interface on Linux to get its information. Implemented by Thorsten Kukuk.
- * `getaddrinfo` now implements `AI_V4MAPPED`, `AI_ALL`, and `AI_ADDRCONF`. Implemented by Ulrich Drepper.
- * support for non-executable stacks on x86 has been added. Changes mostly by Roland McGrath.
- * `regex` is now much faster for multibyte locales. Changes by Jakub Jelinek and Ulrich Drepper.
- * `getaddrinfo` now performs destination address selection according to RFC 3484.

Version 2.3.2

- * Thread-safe interfaces for many functions that access locale data were added in version 2.3, but these features were omitted from NEWS. Many functions have variants with an `'_l'` suffix that take a `'locale_t'` object as a parameter rather than consulting the current locale. The new functions `'newlocale'`, `'duplocale'`, and `'freelocale'` in `<locale.h>` create and maintain `'locale_t'` objects. Additionally, the new function `'uselocale'` sets "the current locale" (as used by functions not so parameterized) set for an individual thread. These features were added in version 2.3, implemented by Ulrich Drepper and Roland McGrath.
- * The functions `getresuid`, `getresgid`, `setresuid`, and `setresgid`, which have long been available on Linux, are now declared in `<unistd.h>` and are now also available on the Hurd.
- * ELF thread-local storage support (TLS) now works on x86-64.
- * The new dynamic string token `$LIB` is expanded in shared library names.

This normally expands to lib, but on some 64-bit platforms to lib64 instead.

- * Aldy Hernandez contributed complete software floating point support for PowerPC machines with no FPU.
- * fexecve is implemented on Linux.
- * The 'btowc' function should work at least twice as fast due to specialized callbacks in the iconv modules. Implemented by Bruno Haible.
- * With appropriate thread add-ons cancelable functions are now implemented in libc.so as well. No need to call the function in libpthread. This change allowed to finally disable the incorrect and expensive handling of weak definition in ld.so.
- * Yet more PLT entries in libc.so have been removed. We finally arrived at the bare minimum. Startup times improved appropriately.
- * Support for the new Linux/x86 system call interface was added. The AT_SYSINFO auxiliary vector entry is recognized and handled.

Version 2.3

- * Masahide Washizawa contributed iconv modules for IBM1163 and IBM1164 charsets.
- * iconv (the program and the interface) now accepts empty names (excluding options like //TRANSLIT) to mean "use charset of current locale".
- * localedef can now transliterate characters in strings which are not in the provided charmap. The information from the input locale is used.
- * Prelinking support was added for ELF targets. This requires additional tools and recent versions of the GNU binutils. Contributed by Jakub Jelinek.
- * Read-only stdio streams now use mmap to speed up operation by eliminating copying and buffer underflows. To use add 'm' to the mode string of the fopen/fdopen/freopen call. Implemented by Ulrich Drepper.
- * The malloc functions were completely rewritten by Wolfram Gloger based on Doug Lea's malloc-2.7.0.c.
- * Isamu Hasegawa contributed a completely new and POSIX-conformant implementation of regex.
- * Bruno Haible upgraded the iconv and locale implementation to support Unicode 3.2.
- * Contents of the LC_* and LANG environment variables in the CEN style are not recognized anymore. It never was used. Change by Ulrich Drepper.
- * The runtime (ld.so, libc, libpthread for Linux) now can handle the ELF thread-local storage (TLS) ABI on some platforms. Changes by Ulrich Drepper. SH support by Kaz Kojima.
- * Bruno Haible contributed iconv converters for ISO-2022-JP-3, SHIFT JIS-X0213, EUC-JISX0213, and TSCII.
- * New header <ifaddrs.h> with functions 'getifaddrs' and 'freeifaddrs': BSD-compatible interface for getting all network interface addresses.

Implementation for IPv4 by Roland McGrath.

- * Loading of locale data is faster due to the introduction of a locale archive. Implemented by Roland McGrath and Ulrich Drepper.
- * Startup times are significantly reduced by not using exported functions inside the library itself. Changes by Jakub Jelinek, Roland McGrath, and Ulrich Drepper.
- * Steven Munroe contributed a port to PowerPC64/Linux.

Version 2.2.6

- * The Hurd now uses the GNU libio implementation of stdio rather than the old GNU stdio implementation, and uses a new ABI (libc.so.0.3).
- * The Hurd on x86 now has the 'ioperm' function and <sys/io.h> header file with the same behavior as the Linux system call of the same name.

Version 2.2.5

- * Stephen Moshier implemented log2, log10, powl and cbrtl for the 128-bit long double format.
- * Masahide Washizawa contributed iconv modules for IBM1132, IBM1133, IBM1160, IBM1161, and IBM1162 charsets.
- * Andreas Jaeger contributed a port to x86-64/Linux.
- * Peter Bruin contributed a port to PowerPC/Hurd.
- * libc functions using I/O streams now can handle wide-oriented streams as well.
- * optimizations in the dynamic linker. Binaries created by recent binutils versions start up quicker due to reduced time spent on relocations.
- * Support for use of gcc3 added by Jakub Jelinek and HJ Lu.

Version 2.2.4

- * Stephen Moshier implemented cosh, expml, loglp, acos, sinh, tanh, asinh, atanh, j0 for the 128-bit long double format.
- * Bruno Haible updated all the code handling Unicode in some form to support Unicode 3.1.
- * Speed of regex for single-byte locales is back to previous levels. Patch by Isamu Hasegawa.
- * Alpha, SPARC, and IA-64 now also using floating stacks.
- * Startup time of internationalized applications greatly improved through iconv cache. Use iconvconfig to generate the cache file. Contributed by Ulrich Drepper.
- * The IA-64 specific part of ld.so was rewritten to eliminate some pretty severe performance problems. Patch by David Mosberger.
- * The Hurd port got a lot more functionality like AIO, various stdio

extensions, etc. Mainly done by Roland McGrath.

* mtrace can now lookup symbols in shared libraries.

Version 2.2.3

- * Intel's IA-64 math library is largely integrated. It provides fast and accurate implementations for most basic and standard math functions in float, double, and long double format.
- * Stephen Moshier implemented `j0`, `j1`, `jn`, `y0`, `y1`, `yn`, `lgamma`, `erf`, `erfc`, and `asin` for the 96-bit long double format and `asin`, `log`, `tan` for the 128-bit long double format.
- * The beginning of a last-bit accurate math library by IBM Haifa were added. The basic double functions exist today. Contributed by Abraham Ziv <ziv@il.ibm.com>, Moshe Olshansky <olshansk@il.ibm.com>, Ealan Henis <ealan@il.ibm.com>, and Anna Reitman <reitman@il.ibm.com>.
- * An asynchronous name lookup library was added. The interface is designed after POSIX AIO. The proposal was circulated beforehand to get comments. No negative ones came in. Implemented by Ulrich Drepper.
- * Port to S390/64bit contributed by Martin Schwidefsky <schwidefsky@de.ibm.com>.
- * David Mosberger <davidm@hpl.hp.com> implemented the `setcontext` family of functions for Linux/IA-64.
- * The RPC code is now thread safe. Threads can now use the same service of different services at the same time. Patch by Eric Norum <eric.norum@usask.ca> with some help by Ulrich Drepper.
- * Martin Schwidefsky <schwidefsky@de.ibm.com> implemented the `setcontext` family of functions for Linux/S390.
- * Ulrich Drepper <drepper@redhat.com> implemented the `setcontext` family of functions for Linux/x86.
- * Port to Linux/CRIS contributed by Axis Communications.

Version 2.2.2

- * Lots of headers were cleaned up. Using the tool in the `conform/` subdir we can now check for namespace violations and missing declarations. The result is that almost all headers are now Unix-compliant (as defined in the upcoming XPG6). The negative side is that some programs might need corrections, too, if they depend on the incorrect form of the headers in previous versions which defined too many symbols and included too many other headers.
- * `regex` now handles multibyte character sets correctly. Contributed by Isamu Hasegawa <isamu@yamato.ibm.com>.
- * `iconv` (the program) does now conform to the upcoming XPG6 and handles charmaps. Instead of the charset names the path of charmaps can be provided and the conversion happens based on this data. Contributed by Ulrich Drepper.
- * The `locale` program now provides detailed information about the installed

locales. While

```
locale -a
```

only lists the names of the supported locales

```
locale -a --verbose
```

provides details such as country, language, and codeset name.
Contributed by Ulrich Drepper.

Version 2.2.1

- * The gencat program now parses the input file according to the charset selected by the LC_CTYPE category. This is important for stateful character sets. To make generating catalogs easier there is a way to overwrite the charset selected by the locale: before the first message or \$ quote line the catalog can contain a line like

```
$ codeset=ISO-8859-2
```

to select the charset (ISO-8859-2 in this case).

Implemented by Shinya Hanataka and Ulrich Drepper.

- * New codeset conversion modules: IBM-922 (Estonia PC codeset), IBM-1124 (Ukraine PC codeset), IBM-1129 (Vietnamese PC codeset). Contributed by Masahide Washizawa <washijp@jp.ibm.com>.
- * Optimized string functions for Alpha ev6 and ev67 by Richard Henderson <rth@redhat.com> and Rick Gorton <rick.gorton@alpha-processor.com>.
- * The LANGUAGE environment variable is now ignored unless the locale is changed from the default "C" locale.
- * The usual bug fixes.

Version 2.2

- * Greg McGary added runtime support for bounds checking using gcc's new -fbounded-pointers option. ix86 target is complete. PowerPC is in progress.
- * Thorsten Kukuk added secure mode support to nscd.
- * The Berkeley db libraries have been removed.

Related, the nss_db module is now in a separate package since it obviously requires a database library being available.

- * Wide character I/O streams implemented by Ulrich Drepper.
- * Functions from the extended socket API added by Ulrich Drepper.
- * Functions feenableexcept and fedisableexcept to control the behaviour of individual exceptions have been added by Andreas Jaeger.
- * ldconfig program added by Andreas Jaeger and Jakub Jelinek.
- * The resolver code has been updated from bind 8.2.3-T5B which supports

threads. The integration was done by Andreas Jaeger, Adam D. Bradley, and Mark Kettenis.

This change could in some situations effect backward compatibility. Since now `'_res'` is a thread-local instead of a global variable, modifying it in one thread does not have any effect in other threads.

The resolver library was also extended to allow IPv6 as the transport protocol for the requests. This work was done by Stig Venaas.

- * Compatibility code for K&R C compilers has been removed from the header files. A ISO C compiler is needed to use the library (conforming to either C89 or C99 standard).
- * Complete rewrite of the `localedef` program to support multibyte character sets. Implement handling of ISO 14651 and ISO 14652. Rewrite `strcoll`, `strxfrm`, `wscoll`, and `wcsxfrm` functions. Make `isw*()` functions work. Implemented by Ulrich Drepper.

Bruno Haible significantly improved the generation and use of the data structures for the wide character tables.

- * Plural handling in `gettext` implemented by Ulrich Drepper.
- * The `utmp` daemon has been removed.
- * The port to MIPS-Linux has been finished by Andreas Jaeger.
- * A port to Hitachi SH3 and SH4 has been contributed by Kazumoto Kojima and Yutaka Niibe.
- * POSIX clocks and timers implemented by Kaz Kylheku and Ulrich Drepper.
- * POSIX barriers implemented by Kaz Kylheku.
- * POSIX spawn function family implemented by Ulrich Drepper.
- * POSIX spinlocks are now available.
- * Timed wait functions for `mutex`, `rwlock`, and `semaphores` are implemented.
- * the configure option `--enable-kernel=X.Y.Z` allows to strip out compatibility for kernel versions before X.Y.Z. This is currently only implemented for Linux.
- * the `sockaddr_in6` structure changed. The IPv6 working group added a new field `sin6_scope_id`. This means that all programs using IPv6 should be recompiled. Don't expect binary compatibility with previous `glibc` versions.
- * various conversion modules for IBM character sets contributed by Masahide Washizawa.
- * IA-64 port by Jes Sorensen and HJ Lu.

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Compiling the GNU C Library for Linux/ia64  
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Please refer to the file `INSTALL` in the same directory as you found

this file for general information about configuring and compiling glibc.

For general inquiries about glibc under Linux/ia64 please use the following mailing list [linux-ia64@linuxia64.org](mailto:linux-ia64@linuxia64.org) or one of the relevant glibc mailing lists.

#### Recommended Tools for Compilation

=====

In order for glibc-2.2 to build correctly on the ia64 you need at least the following versions of the GNU tools (the :

- \* The Cygnus toolchain snapshot for the ia64 as of August 4 including the provided set of patches. It is however recommend you use the October 24 toolchain snapshot or a more recent version.

OR alternatively you can try the following (the Cygnus toolchain is the recommended solution):

- \* GCC and binutils, GAS and GNU LD out of CVS from [sources.redhat.com](http://sources.redhat.com) as of August 28, 2000 or later. The CVS tree may require special patches to work properly on the ia64.

#### Configuring and compiling GNU Libc for Linux/ia64

=====

The library requires Linux kernel version 2.4.0-test4-000728 or later to function properly. Besides that it support for debug libraries is currently untested. Hence the following options are required for configuring the library:

```
--disable-debug --enable-kernel=2.4.0
```

It is also important that you make sure the library picks up the appropriate kernel header files, if you do not have recent enough kernel headers in `/usr/src/linux/include`, you should use the `--with-headers=<path>` option to specify the location.

As an example I personally use the following options to configure the library:

```
--disable-debug
--disable-cvs
--enable-kernel=2.4.0
--host=ia64-linux
--enable-add-ons=yes
--prefix=/usr
--with-headers=/home/jes/linux/include
```

Good luck

Jes Sorensen <[jes@linuxcare.com](mailto:jes@linuxcare.com)>,
November 14th, 2000

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Version 2.1.3

* bug fixes

Version 2.1.2

- * bug fixes

Version 2.1.1

- * New ISO C 9x function `_Exit`, `imaxabs`, and `imaxdiv` are added.
- * New xdr functions are added; some rpc functions are now 64bit clean.
- * Fixed a number of bugs and memory leaks (especially in NIS+ code).
- * Fixed known incompatibilities with glibc 2.0.
- * New functions `lock64`, `strchrnul`, `rawmemchr`, `getutmp` and `getutmpx`.
- * Optimized a number of functions (especially the ELF dynamic loader).
- * Update timezone data files.
- * lots of charmaps corrections
- * some new locale definitions and charmaps

Version 2.1

- * Richard Henderson corrected size of struct `timeval` on Linux/Alpha to conform to POSIX member type requirements. Symbol versions have been adjusted as needed within the library, and for direct use by applications, but there is potential for problems if third-party libraries use struct `timeval` as part of their interface. This does not present a problem for X and other "essential" system libraries.
- * An additional locale model to support C++ Standard Library locale model and probably more was implemented by Ulrich Drepper.
- * Eric Youngdale and Ulrich Drepper implemented versioning of objects on symbol level.
- * Miles Bader provided the 'argp' function family to support hierarchical command line argument parsing, layered on top of `getopt`.
- * `strtod` accepts new hexadecimal floating-point format from ISO C 9X.
- * `printf` has two new specifiers `%a` and `%A` to print hexadecimal floating-point numbers.
- * `scanf` recognizes the `%a` and `%A` format for scanning floating point numbers.
- * the new headers `<stdint.h>` and `<inttypes.h>` from ISO C 9X provides information and interfaces for the available integer types.
- * about 130 new math functions were added to implement the ISO C9x math library.
- * the new header `<complex.h>` contains definitions of the complex math

functions from ISO C 9X.

- * the new header <tgmath.h> defines generic macros to use complex or real valued functions.
- * Thorsten Kukuk provided an implementation for NIS+, securelevel 0, 1 and 2.
- * Andreas Jaeger provided a test suite for the math library.
- * Mark Kettenis implemented the utmpx interface and an utmp daemon.
- * Ulrich Drepper added character set conversion functions (iconv).
- * Optimized string functions have been added.
- * The localedata addon is now part of glibc.
- * An implementation of profiling shared libraries was added by Ulrich Drepper.
- * Thorsten Kukuk and Ulrich Drepper provided an implementation for a caching daemon for NSS (nscd).

Missing a better place here are some numbers on improvements. Under Linux 2.1.125 un-tar-ing the kernel sources takes

	user	system	wall
using local files	12.19s	6.88s	22.91s
using NIS	13.92s	8.91s	26.34s
using NIS & nscd	10.37s	7.34s	25.30s
using NIS+	27.57s	30.37s	640.46s
using NIS+ & nscd	10.25s	7.83s	26.51s
using NIS & old nscd [1]	13.83s	8.32s	29.60s

Keep in mind that non-namelookup related operations dominate above times. It was just a common complain that using NIS+ unpacking the kernel is horribly slow.

[1] The old nscd implementation is not available anymore since it was distributed with glibc up to version 2.0.98 and thus is now replaced.

- * Tim Waugh provided an implementation of the POSIX.2 wordexp function family.
- * Mark Kettenis provided a Hesiod NSS module.
- * The ELF dynamic loader knows how to process dynamic string tokens (\$ORIGIN and \$PLATFORM) in RPATHs and similar strings (Ulrich Drepper).
- * rcmd can now handle netgroups (Dick Streefland).
- * A port to the ARM was contributed by Phil Blundell, Pat Beirne and Scott Bambrough.
- * Support for the IPv6 protocol has been added to the socket API, as per the latest draft standards.

* Support for Linux 2.2 has been added.

* Interface changes relative to the latest 2.0.x release:

addseverity	NEW: Unix98
alphasort64	NEW: LFS
argp_err_exit_status	NEW: argp, GNU ext
argp_error	NEW: argp, GNU ext
argp_failure	NEW: argp, GNU ext
argp_help	NEW: argp, GNU ext
argp_parse	NEW: argp, GNU ext
argp_program_bug_address	NEW: argp, GNU ext
argp_program_version	NEW: argp, GNU ext
argp_program_version_hook	NEW: argp, GNU ext
argp_state_help	NEW: argp, GNU ext
argp_usage	NEW: argp, GNU ext
authdes_create	NEW: Secure RPC
authdes_getucred	NEW: Secure RPC
authdes_pk_create	NEW: Secure RPC
backtrace	NEW: GNU ext.
backtrace_symbols	NEW: GNU ext.
backtrace_symbols_fd	NEW: GNU ext.
cacos	NEW: ISO C 9x
cacosf	NEW: ISO C 9x
cacosh	NEW: ISO C 9x
cacoshf	NEW: ISO C 9x
cacoshl	NEW: ISO C 9x
cacosl	NEW: ISO C 9x
capget	NEW: kernel
capset	NEW: kernel
carg	NEW: ISO C 9x
cargf	NEW: ISO C 9x
cargl	NEW: ISO C 9x
casin	NEW: ISO C 9x
casinf	NEW: ISO C 9x
casinh	NEW: ISO C 9x
casinhf	NEW: ISO C 9x
casinhl	NEW: ISO C 9x
casinl	NEW: ISO C 9x
catan	NEW: ISO C 9x
catanf	NEW: ISO C 9x
catanh	NEW: ISO C 9x
catanhf	NEW: ISO C 9x
catanhl	NEW: ISO C 9x
catanl	NEW: ISO C 9x
cbc_crypt	NEW: Secure RPC
ccos	NEW: ISO C 9x
ccosf	NEW: ISO C 9x
ccosh	NEW: ISO C 9x
ccoshf	NEW: ISO C 9x
ccoshl	NEW: ISO C 9x
ccosl	NEW: ISO C 9x
cexp	NEW: ISO C 9x
cexpf	NEW: ISO C 9x
cexpl	NEW: ISO C 9x
cimag	NEW: ISO C 9x
cimagf	NEW: ISO C 9x
cimagl	NEW: ISO C 9x
clearerr_locked	REMOVED

clntunix_create	NEW: sunrpc ext
clog	NEW: ISO C 9x
clog10	NEW: ISO C 9x
clog10f	NEW: ISO C 9x
clog10l	NEW: ISO C 9x
clogf	NEW: ISO C 9x
clogl	NEW: ISO C 9x
conj	NEW: ISO C 9x
conjf	NEW: ISO C 9x
conjl	NEW: ISO C 9x
cpow	NEW: ISO C 9x
cpowf	NEW: ISO C 9x
cpowl	NEW: ISO C 9x
cproj	NEW: ISO C 9x
cprojf	NEW: ISO C 9x
cprojl	NEW: ISO C 9x
creal	NEW: ISO C 9x
crealf	NEW: ISO C 9x
creall	NEW: ISO C 9x
creat64	NEW: LFS
csin	NEW: ISO C 9x
csinf	NEW: ISO C 9x
csinh	NEW: ISO C 9x
csinhf	NEW: ISO C 9x
csinhl	NEW: ISO C 9x
csinl	NEW: ISO C 9x
csqrt	NEW: ISO C 9x
csqrtf	NEW: ISO C 9x
csqrtl	NEW: ISO C 9x
ctan	NEW: ISO C 9x
ctanf	NEW: ISO C 9x
ctanh	NEW: ISO C 9x
ctanhf	NEW: ISO C 9x
ctanhl	NEW: ISO C 9x
ctanl	NEW: ISO C 9x
des_setparity	NEW: Secure RPC
ecb_crypt	NEW: Secure RPC
endutxent	NEW: Unix98
exp10	NEW: ISO C 9x
exp10f	NEW: ISO C 9x
exp10l	NEW: ISO C 9x
exp2	NEW: ISO C 9x
exp2f	NEW: ISO C 9x
exp2l	NEW: ISO C 9x
fattach	NEW: STREAMS
fdetach	NEW: STREAMS
fdim	NEW: ISO C 9x
fdimf	NEW: ISO C 9x
fdiml	NEW: ISO C 9x
feclearexcept	NEW: ISO C 9x
fegetenv	NEW: ISO C 9x
fegetexceptflag	NEW: ISO C 9x
fegetround	NEW: ISO C 9x
feholdexcept	NEW: ISO C 9x
feof_locked	REMOVED
feraiseexcept	NEW: ISO C 9x
ferror_locked	REMOVED
fesetenv	NEW: ISO C 9x
fesetexceptflag	NEW: ISO C 9x
fesetround	NEW: ISO C 9x

fetestexcept	NEW: ISO C 9x
feupdateenv	NEW: ISO C 9x
fflush_locked	REMOVED
ffsl	NEW: GNU ext.
ffsll	NEW: GNU ext.
fgetpos64	NEW: LFS
fgets_unlocked	NEW: GNU ext.
fileno_locked	REMOVED
fma	NEW: ISO C 9x
fmaf	NEW: ISO C 9x
fmal	NEW: ISO C 9x
fmax	NEW: ISO C 9x
fmaxf	NEW: ISO C 9x
fmaxl	NEW: ISO C 9x
fmin	NEW: ISO C 9x
fminf	NEW: ISO C 9x
fminl	NEW: ISO C 9x
fmtmsg	NEW: Unix98
fopen64	NEW: LFS
fputc_locked	REMOVED
fputs_unlocked	NEW: GNU ext.
fread_unlocked	NEW: GNU ext.
freopen64	NEW: LFS
fseeko	NEW: Unix98
fsetpos64	NEW: LFS
fstatfs64	NEW: LFS
fstatvfs	NEW: Unix98
fstatvfs64	NEW: LFS
ftello	NEW: Unix98
ftello64	NEW: LFS
ftruncate64	NEW: LFS
ftw64	NEW: LFS
fwrite_unlocked	NEW: GNU ext.
gai_strerror	NEW: IPv6
gamma_r	REMOVED
gammaf_r	REMOVED
gammal_r	REMOVED
getchar_locked	REMOVED
getdate	NEW: Unix98
getdate_err	NEW: Unix98
getdate_r	NEW: GNU ext.
getmsg	NEW: STREAMS
getnameinfo	NEW: IPv6
getnetname	NEW: Secure RPC
getpmsg	NEW: STREAMS
getpt	NEW: Unix98 PTY
getrlimit64	NEW: LFS
getutxent	NEW: Unix98
getutxid	NEW: Unix98
getutxline	NEW: Unix98
glob64	NEW: GNU ext.
globfree64	NEW: GNU ext.
gnu_get_libc_release	NEW: GNU ext.
gnu_get_libc_version	NEW: GNU ext.
grantpt	NEW: Unix98 PTY
host2netname	NEW: Secure RPC
iconv	NEW: iconv
iconv_close	NEW: iconv
iconv_open	NEW: iconv
if_freenameindex	NEW: IPv6

if_indextoname	NEW: IPv6
if_nameindex	NEW: IPv6
if_nametoindex	NEW: IPv6
in6addr_any	NEW: IPv6
in6addr_loopback	NEW: IPv6
inet6_isipv4mapped	NEW: IPv6
isastream	NEW: STREAMS
iswblank	NEW: GNU ext.
key_decryptsession	NEW: Secure RPC
key_decryptsession_pk	NEW: Secure RPC
key_encryptsession	NEW: Secure RPC
key_encryptsession_pk	NEW: Secure RPC
key_gendes	NEW: Secure RPC
key_get_conv	NEW: Secure RPC
key_secretkey_is_set	NEW: Secure RPC
key_setnet	NEW: Secure RPC
key_setsecret	NEW: Secure RPC
llrint	NEW: ISO C 9x
llrintf	NEW: ISO C 9x
llrintl	NEW: ISO C 9x
llround	NEW: ISO C 9x
llroundf	NEW: ISO C 9x
llroundl	NEW: ISO C 9x
log2	NEW: ISO C 9x
log2f	NEW: ISO C 9x
log2l	NEW: ISO C 9x
lrint	NEW: ISO C 9x
lrintf	NEW: ISO C 9x
lrintl	NEW: ISO C 9x
lround	NEW: ISO C 9x
lroundf	NEW: ISO C 9x
lroundl	NEW: ISO C 9x
lseek64	NEW: LFS
makecontext	NEW: Unix98
mempcpy	NEW: GNU ext.
mmap64	NEW: LFS
moncontrol	REMOVED
modify_ldt	NEW: kernel
nan	NEW: ISO C 9x
nanf	NEW: ISO C 9x
nanl	NEW: ISO C 9x
nearbyint	NEW: ISO C 9x
nearbyintf	NEW: ISO C 9x
nearbyintl	NEW: ISO C 9x
netname2host	NEW: Secure RPC
netname2user	NEW: Secure RPC
nexttoward	NEW: ISO C 9x
nexttowardf	NEW: ISO C 9x
nexttowardl	NEW: ISO C 9x
nftw	NEW: Unix98
nftw64	NEW: LFS
open64	NEW: LFS
passwd2des	NEW: Secure RPC
pow10	NEW: GNU ext.
pow10f	NEW: GNU ext.
pow10l	NEW: GNU ext.
pread	NEW: Unix98
pread64	NEW: LFS
printf_size	NEW: GNU ext.
printf_size_info	NEW: GNU ext.

profil_counter	REMOVED
pthread_mutexattr_getkind_np	REPLACED
pthread_mutexattr_setkind_np	REPLACED
ptsname	NEW: Unix98 PTY
ptsname_r	NEW: Unix98 PTY
putc_locked	REMOVED
putchar_locked	REMOVED
putgrent	NEW: GNU ext.
putmsg	NEW: STREAMS
putpmsg	NEW: STREAMS
pututxline	NEW: Unix98
pwrite	NEW: Unix98
pwrite64	NEW: LFS
readdir64	NEW: LFS
readdir64_r	NEW: LFS
remquo	NEW: ISO C 9x
remquof	NEW: ISO C 9x
remquol	NEW: ISO C 9x
round	NEW: ISO C 9x
roundf	NEW: ISO C 9x
roundl	NEW: ISO C 9x
rtime	NEW: GNU ext.
scalbln	NEW: ISO C 9x
scalblnf	NEW: ISO C 9x
scalblnl	NEW: ISO C 9x
scandir64	NEW: LFS
sendfile	NEW: kernel
setcontext	NEW: Unix98
setrlimit64	NEW: LFS
setutxent	NEW: Unix98
sighold	NEW: Unix98
sigignore	NEW: Unix98
sigqueue	NEW: POSIX.1b
sigrelse	NEW: Unix98
sigset	NEW: POSIX.1b
sigtimedwait	NEW: POSIX.1b
sigwaitinfo	NEW: POSIX.1b
sincos	NEW: GNU ext.
sincosf	NEW: GNU ext.
sincosl	NEW: GNU ext.
statfs64	NEW: LFS
statvfs	NEW: Unix98
statvfs64	NEW: LFS
strcasestr	NEW: GNU ext.
strtoimax	NEW: ISO C 9x
strtoumax	NEW: ISO C 9x
strverscmp	NEW: GNU ext.
svcauthdes_stats	NEW: Secure RPC
svcunix_create	NEW: sunrpc etx
svcunixfd_create	NEW: sunrpc ext
swapcontext	NEW: Unix98
tcgetsid	NEW: Unix98 PTY
tdestroy	NEW: GNU ext.
tgamma	NEW: ISO C 9x
tgammaf	NEW: ISO C 9x
tgamma1	NEW: ISO C 9x
tmpfile64	NEW: LFS
trunc	NEW: ISO C 9x
truncate64	NEW: LFS
truncf	NEW: ISO C 9x

trunc1	NEW: ISO C 9x
umount2	NEW: kernel
unlockpt	NEW: Unix98 PTY
updwtmpx	NEW: Unix98
user2netname	NEW: Secure RPC
utmpxname	NEW: Unix98
versionsort	NEW: GNU ext.
versionsort64	NEW: GNU ext.
waitid	NEW: Unix98
wscasecmp	NEW: GNU ext.
wcsncasecmp	NEW: GNU ext.
wcsnlen	NEW: GNU ext.
wcstoimax	NEW: ISO C 9x
wcstoll	NEW: ISO C 9x
wcstoull	NEW: ISO C 9x
wcstoumax	NEW: ISO C 9x
wcswcs	NEW: Unix98
wordexp	NEW: POSIX.2
wordfree	NEW: POSIX.2
write_profiling	REMOVED
xdecrypt	NEW: Secure RPC
xdr_authdes_cred	NEW: Secure RPC
xdr_authdes_verf	NEW: Secure RPC
xdr_cryptkeyarg	NEW: Secure RPC
xdr_cryptkeyarg2	NEW: Secure RPC
xdr_cryptkeyres	NEW: Secure RPC
xdr_getcredres	NEW: Secure RPC
xdr_key_netstarg	NEW: Secure RPC
xdr_key_netstres	NEW: Secure RPC
xdr_keybuf	NEW: Secure RPC
xdr_keystatus	NEW: Secure RPC
xdr_netnamestr	NEW: Secure RPC
xdr_sizeof	NEW: Secure RPC
xdr_unixcred	NEW: sunrpc ext
xencrypt	NEW: Secure RPC

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Version 2.0.6

\* more bug fixes

Version 2.0.5

\* more bug fixes

\* inet\_ntoa is thread-safe

\* updwtmp is moved from libutil to libc

\* rewrite of cbrt function

\* update of timezone data

Version 2.0.4

\* more bug fixes

Version 2.0.3

- \* more bug fixes

#### Version 2.0.2

- \* more bug fixes

- \* add atoll function

- \* fix complex problems in Berkeley DB code

- \* fix math functions

#### Version 2.0.1

- \* fixed lots of header problems (especially Linux/GNU specific)

- \* dynamic loader preserves all registers

- \* Roland McGrath provided support for handling of auxiliary objects in the ELF dynamic loader.

- \* support for parallel builds is improved

#### Version 2.0

- \* GNU extensions are no longer declared by default. To enable them you must define the macro `'_GNU_SOURCE'` in your program or compile with `'-D_GNU_SOURCE'`.

- \* The library has changed from using GNU ld symbol aliases to using weak symbols where available. The ELF object file format supports weak symbols; GNU ld also supports weak symbols in the a.out format. (There is also now support for other GNU ld extensions in ELF. Use the `'--with-elf'` option to configure to indicate you have ELF, and `'--with-gnu-ld'` if using GNU ld.) This change resulted in the deletion of many files which contained only symbol aliases, reducing the size of the source and the compiled library; many other files were renamed to less cryptic names previously occupied by the symbol alias files. There is a new header file `<elf.h>` for programs which operate on files in the ELF format.

- \* Converted to Autoconf version 2, so `'configure'` has more options. Run `'configure --help'` to see the details.

- \* The library can now be configured to build profiling, highly-optimized (but undebuggable), and/or shared libraries (ELF with GNU ld only). The `'--enable-profile'`, `'--enable-omitfp'`, and `'--enable-shared'` options to `'configure'` enable building these extra libraries. The shared library is built by default when using both ELF and GNU ld. When shared libraries are enabled, the new library `'-ldl'` is available for arbitrary run-time loading of shared objects; its interface is defined in `<dlfcn.h>`. The new header file `<link.h>` gives access to the internals of the run-time dynamic linker, `'ld.so'`. The shell script `'ldd'` is similar to the application of same name on other systems and it provides information about dynamically linked binaries.

- \* The C library now provides the run-time support code for profiling executables compiled with `'-pg'`. Programs can control the profiling code through the interface in `<sys/gmon.h>`. The `'gmon.out'` files written by the GNU C library can be read only by GNU `'gprof'` (from GNU binutils);

the support for this file format was contributed by David Mosberger-Tang.

- \* The math code has been replaced with a math library based on fdlibm from Sun, and modified by JT Conklin and Ulrich Drepper with i387 support, by Ian Taylor with 'float' functions and by Ulrich Drepper with 'long double' functions. The math functions now reside in a separate library, so programs using them will need to use '-lm' their linking commands.
- \* John C. Bowman contributed optimized ix87 assembler inline functions.
- \* Ulrich Drepper has contributed support for an '/etc/nsswitch.conf' mechanism similar to that found in Solaris 2. This is now used for the group, passwd, hosts, networks, services, protocols, rpc, ethers, shadow, netgroup, publickey, and alias databases. The 'nsswitch.conf' file controls what services are used for each individual database. This works by loading shared libraries with names specified in 'nsswitch.conf', so service modules can be changed or added at any time without even relinking any program. Currently there are the file, db, and NIS based NSS services available.
- \* The new functions 'strtoq' and 'strtouq' parse integer values from strings, like 'strtol' and 'strtoul', but they return 'long long int' and 'unsigned long long int' values, respectively (64-bit quantities).
- \* The new functions 'strtof' and 'strtold' parse floating-point values from strings, like 'strtod', but they return 'float' and 'long double' values, respectively (on some machines 'double' and 'long double' are the same).
- \* Ulrich Drepper has contributed new implementations of the floating-point printing and reading code used in the 'printf' family of functions and 'strtod', 'strtof', and 'strtold'. These new functions are perfectly accurate, and much faster than the old ones.
- \* The implementation of the POSIX locale model was completely rewritten by Ulrich Drepper. This includes the new programs 'localedef' and 'locale' to compile the POSIX locale definition.
- \* The former dummy implementations of the strcoll and strxfrm function are now replaced by fully functional code contributed by Ulrich Drepper. The collation information comes from the POSIX locale definitions.
- \* The new header <langinfo.h> defines an interface for accessing various locale-dependent data (using the locale chosen with 'setlocale').
- \* Ulrich Drepper has contributed a new suite of functions for operation on wide-character and multibyte-character strings, in <wchar.h>; and classification and case conversion of wide characters, in <wctype.h>. These new functions are conforming to the ISO C, Amendment 1 specification.
- \* There is now a second implementation of the standard I/O library available. It comes from GNU libg++ as was written by Per Bothner, heavily modified by Hongjiu Lu and made thread safe by Ulrich Drepper.
- \* You can now use positional parameter specifications in format strings for the 'printf' and 'scanf' families of functions. For example, 'printf ("Number %2\$d, Mr %1\$s\n", "Jones", 6);' prints 'Number 6, Mr Jones'. This is mainly useful when providing different format strings for different languages, whose grammars may dictate different orderings of the values being printed. To support this feature, the interface for 'register\_printf\_handler' has changed; see

the header file `<printf.h>` for details.

- \* The 'printf' and 'scanf' families of functions now understand a new formatting flag for numeric conversions: the 'G' flag (e.g. `%d` or `%f`) says to group numbers as indicated by the locale; for 'scanf' and friends, this says to accept as valid only a number with all the proper grouping separators in the right places. In the default "C" locale, numbers are not grouped; but locales for specific countries will define the usual conventions (i.e. separate thousands with ',' in the US locale).
- \* The pgrp functions have been regularized, slightly incompatibly but much less confusingly. The core functions are now 'getpgrp' and 'setpgrp', which take arguments for the PID to operate on; the POSIX.1 'getpgrp' (no argument) and BSD 'setpgrp' (identical to 'setpgrp') functions are provided for compatibility. There is no longer an incompatible 'getpgrp' with an argument declared under `_BSD_SOURCE`; no BSD code uses it.
- \* The new header file `<fts.h>` and suite of functions simplify programs that operate on directory trees. This code comes from 4.4 BSD.
- \* The resolver code has been updated from the BIND 4.9.5-P1 release. Parts of the code were heavily modified by Ulrich Drepper to fit in the NSS scheme used in glibc.
- \* There is a new malloc debugging hook `'__memalign_hook'`.
- \* There are new typedefs 'ushort' for 'unsigned short int' and 'uint' for 'unsigned int' in `<sys/types.h>`. These are for compatibility only and their use is discouraged.
- \* The '-lmcheck' library to enable standard malloc debugging hooks is now done differently, so that it works even without GNU ld.
- \* New function 'euidaccess' checks allowed access to a file like 'access', but using the effective IDs instead of the real IDs.
- \* The time zone data files have been updated for the latest and greatest local time conventions of the countries of the world.
- \* The new function 'dirfd' extracts the file descriptor used by a DIR stream; see `<dirent.h>`.
- \* The new functions 'ecvt', 'fcvt', and 'gcvt' provide an obsolete interface for formatting floating-point numbers. They are provided only for compatibility; new programs should use 'sprintf' instead. There are also equivalent function for the 'long double' floating-point type and all functions also exist in a reentrant form.
- \* The new auxiliary library '-lutil' from 4.4 BSD contains various functions for maintaining the login-record files (primarily of use to system programs such as 'login'), and convenient functions for allocating and initializing a pseudo-terminal (pty) device.
- \* Ulrich Drepper has contributed new support for System V style shared memory and IPC on systems that support it.
- \* Ulrich Drepper has contributed several miscellaneous new functions found in System V: The 'hsearch' family of functions provide an effective implementation of hash tables; 'a64l' and 'l64a' provide a very simple binary to ASCII mapping; 'drand48' and friends provide a 48-bit random

number generator.

- \* Ulrich Drepper has contributed new reentrant counterparts for the 'random' and 'hsearch' families of functions; 'random\_r', 'hsearch\_r', etc.
- \* Ulrich Drepper has contributed new, highly-optimized versions of several string functions for the i486/Pentium family of processors.
- \* Ulrich Drepper has updated the Linux-specific code, based largely on work done in Hongjiu Lu's version of GNU libc for Linux. The GNU library now supports Linux versions 2.0.10 and later, using the ELF object file format (i[3456]86-\*-linux).
- \* Andreas Schwab has ported the C library to Linux/m68k (m68k-\*-linux).
- \* David Mosberger-Tang and Richard Henderson have ported the C library to Linux/Alpha (alpha-\*-linux). Richard Henderson contributed the dynamic linking support for ELF/Alpha.
- \* Richard Henderson contributed several Alpha optimized assembler function for arithmetic and string handling.
- \* Ulrich Drepper has contributed a new set of message catalog functions to support multiple languages using the <libintl.h> interface, for use with his new package GNU gettext. Translation volunteers have contributed catalogs of the library's messages in Spanish, German, and Korean.
- \* For compatibility with XPG4, Ulrich Drepper has contributed the 'gencat' program and the 'catgets' function for reading the catalog files it creates. (The <libintl.h> interface is preferred; we include the <nl\_types.h> interface using 'catgets' only for source compatibility with programs already written to use it.)
- \* New header file <values.h> gives SVID-compatible names for <limits.h> constants.
- \* Various new macros, declarations, and small header files for compatibility with 4.4 BSD.
- \* New function 'group\_member' is a convenient way to check if a process has a given effective group ID.
- \* When using GCC 2.7 and later, the socket functions are now declared in a special way so that passing an argument of type 'struct sockaddr\_in \*', 'struct sockaddr\_ns \*', or 'struct sockaddr\_un \*' instead of the generic 'struct sockaddr \*' type, does not generate a type-clash warning.
- \* New function 'error' declared in header file <error.h> is a convenient function for printing error messages and optionally exiting; this is the canonical function used in GNU programs. The new functions 'err', 'warn', and friends in header file <err.h> are the canonical 4.4 BSD interface for doing the same thing.
- \* The <glob.h> interface has several new flags from 4.4 BSD that extend the POSIX.2 'glob' function to do ~ and {...} expansion.
- \* New function 'unsetenv' complements 'setenv' for compatibility with 4.4 BSD. 'clearenv' which is used in POSIX.9 is also available.
- \* New function 'getsid' returns session ID number on systems that support it.

- \* We have incorporated the 4.4 BSD 'db' library (version 1.85). New header files <db.h> and <mppool.h> provide a rich set of functions for several types of simple databases stored in memory and in files, and <ndbm.h> is an old 'ndbm'-compatible interface using the 'db' functions. Link with '-ldb' to get these functions.
- \* New macro 'strdupa' copies a string like 'strdup', but uses local stack space from 'alloca' instead of dynamic heap space from 'malloc'.
- \* New function 'strnlen' is like 'strlen' but searches only a given maximum number of characters for the null terminator. 'stpncpy', 'strndup' and 'strndupa' are similar variants for the 'stpncpy', 'strdup' and 'strdupa' function.
- \* New function 'statfs' in header <sys/statfs.h>.
- \* The new <argz.h> and <envz.h> interfaces contributed by Miles Bader provide convenient functions for operating on blocks of null-terminated strings.
- \* A new suite of functions in <utmp.h> handle all the details of reading and writing the utmp file.
- \* An implementation of the NIS/YP(tm) based NSS service was contributed by Thorsten Kukuk.
- \* Paul Eggert and Ulrich Drepper modified the 'strftime' function to be completely POSIX compliant and also implemented the extended functionality to handle alternate digit representation and alternate era date formats.
- \* Ulrich Drepper provided an implementation of the 'strptime' function defined in XPG4.2 which transforms a string into a 'struct tm' value.
- \* Paul Eggert provided the tzselect shell script as part of the timezone code. The shell script makes it easy to select the correct timezone specification.
- \* The implementation of the malloc family of functions is completely replaced by a new implementation by Doug Lea with many improvements by Wolfram Gloger. The implementation uses the mmap function (if available) and it is optimized for the use in multi threaded programs.
- \* Ulrich Drepper contributed a MD5 "encryption" for the crypt family of functions. This new functionality is usable by specifying a special salt string and it is compatible with implementation on \*BSD systems.
- \* Lots of functions from the XPG4.2 standard were added by Ulrich Drepper: 'getsubopt' to handle second level command line options, 'bsd\_signal' to access BSD style 'signal' functionality, the obsolete 'regexp' style expression matcher.
- \* the 'lchown' function is available on system which support this functionality.
- \* The implementation of the shadow password handling function was contributed by Ulrich Drepper.
- \* David Mosberger-Tang changed the SunRPC implementation to be 64bit safe.

- \* POSIX.1g support was added. The <sys/select.h> header is available, 'isfdtype' and 'pselect' are implemented. Craig Metz contributed an implementation of 'getaddrinfo'.

#### Version 1.09

- \* For cross-compilation you should now set 'BUILD\_CC' instead of 'HOST\_CC'.
- \* New header file <fstab.h> and new functions 'getfsspec', 'getfsent' and friends, for parsing /etc/fstab. This code comes from 4.4 BSD.
- \* The new function 'daemon' from 4.4 BSD is useful for server programs that want to put themselves in the background.
- \* Joel Sherrill has contributed support for several standalone boards that run without an operating system.
- \* 'printf', 'scanf' and friends now accept a 'q' type modifier for long long int as well as 'll'. Formats using these might be '%qu' or '%lld'.
- \* All of the code taken from BSD (notably most of the math and networking routines) has been updated from the BSD 4.4-Lite release.
- \* The resolver code has been updated from the BIND-4.9.3-BETA9 release.
- \* The new functions 'getdomainname' and 'setdomainname' fetch or change the YP/NIS domain name. These are system calls which exist on systems which have YP (aka NIS).
- \* The time zone data files have been updated for the latest international conventions.
- \* The SunRPC programs 'portmap' and 'rpcinfo' are now installed in \$(sbindir) (usually /usr/local/sbin) instead of \$(bindir).

#### Version 1.08

- \* The C library now includes support for Sun RPC, from Sun's free RPCSRC-4.0 distribution. The 'portmap', 'rpcinfo', and 'rpcgen' programs are included. (There is still no support for YP.)
- \* Tom Quinn has contributed a port of the C library to SGI machines running Irix 4 (mips-sgi-irix4).
- \* The new 'lockf' function is a simplified interface to the locking facilities of 'fcntl', included for compatibility.
- \* New time functions 'timegm', 'timelocal', and 'dysize' for compatibility.
- \* New header file <sys/timeb.h> and new function 'ftime' for compatibility.
- \* New header files <poll.h> and <sys/poll.h> and new function 'poll' for compatibility.
- \* The error message printed by 'assert' for a failed assertion now includes the name of the program (if using GNU ld) and the name of the calling function (with versions of GCC that support this).
- \* The 'psignal' function is now declared in <signal.h>, not <stdio.h>.

- \* The library now includes the `<sys/mman.h>` header file and memory management functions `'mmap'`, `'munmap'`, `'mprotect'`, `'msync'`, and `'madvise'`, on systems that support those facilities.
- \* The interface for `'mcheck'` has changed slightly: the function called to abort the program when an allocation inconsistency is detected now takes an argument that indicates the type of failure. The new function `'mprobe'` lets you request a consistency check for a particular block at any time (checks are normally done only when you call `'free'` or `'realloc'` on a block).
- \* It is now possible to easily cross-compile the C library, building on one system a library to run on another machine and/or operating system. All you need to do is set the variable `'HOST_CC'` in `'configparms'` to the native compiler for programs to run on the machine you are building on (a few generator programs are used on Unix systems); set `'CC'` to the cross-compiler.
- \* The new function `'fexecve'` (only implemented on the GNU system) executes a program file given a file descriptor already open on the file.

#### Version 1.07

- \* Brendan Kehoe has contributed most of a port to the DEC Alpha running OSF/1 (alpha-dec-osf1). He says it is 75% complete.
- \* You can set the variable `'libprefix'` in `'configparms'` to specify a prefix to be prepended to installed library files; this makes it easy to install the GNU C library to be linked as `'-lgnuc'` or whatever.
- \* The new `'stpncpy'` is a cross between `'strcpy'` and `'strncpy'`: It copies a limited number of characters from a string, and returns the address of the last character written.
- \* You no longer need to check for whether the installed `'stddef.h'` is compatible with the GNU C library. `configure` now checks for you.
- \* You can now define a per-stream `'fileno'` function to convert the stream's cookie into an integral file descriptor.
- \* `'malloc (0)'` no longer returns a null pointer. Instead, it allocates zero bytes of storage, and returns a unique pointer which you can pass to `'realloc'` or `'free'`. The behavior is undefined if you dereference this pointer.
- \* The C library now runs on Sony NEWS m68k machines running either NewsOS 3 or NewsOS 4.
- \* The new `'syscall'` function is a system-dependent primitive function for invoking system calls. It has the canonical behavior on Unix systems, including unreliable return values for some calls (such as `'pipe'`, `'fork'` and `'getppid'`).
- \* The error code `'EWOULDBLOCK'` is now obsolete; it is always defined to `'EAGAIN'`, which is the preferred name. On systems whose kernels use two distinct codes, the C library now translates `EWOULDBLOCK` to `EAGAIN` in every system call function.

#### Version 1.06

- \* The GNU C Library Reference Manual is now distributed with the library. 'make dvi' will produce a DVI file of the printed manual. 'make info' will produce Info files that you can read on line using C-h i in Emacs or the 'info' program. Please send comments on the manual to [bug-glibc-manual@gnu.org](mailto:bug-glibc-manual@gnu.org).
- \* The library now supports SVR4 on i386s (i386-unknown-sysv4).
- \* Brendan Kehoe has contributed a port to Sun SPARCs running Solaris 2.
- \* Jason Merrill has contributed a port to the Sequent Symmetry running Dynix version 3 (i386-sequent-dynix).
- \* The library has been ported to i386s running SCO 3.2.4 (also known as SCO ODT 2.0; i386-unknown-sco3.2.4) or SCO 3.2 (i386-unknown-sco3.2).
- \* New function 'memory\_warnings' lets you arrange to get warnings when malloc is running out of memory to allocate, like Emacs gives you.
- \* The C library now contains the relocating allocator used in Emacs 19 for its editing buffers. This allocator (ralloc) minimizes allocation overhead and fragmentation by moving allocated regions around whenever it needs to. You always refer to a ralloc'd region with a "handle" (a pointer to a pointer--an object of type 'void \*\*').
- \* There is a new 'printf' format: '%m' gives you the string corresponding to the error code in 'errno'.
- \* In 'scanf' formats, you can now use '%as' or '%a[' to do the normal '%s' or '%[' conversion, but instead of filling in a fixed-sized buffer you pass, the 'a' modifier says to fill in a 'char \*\*' you pass with a malloc'd string.
- \* The 'fnmatch' function supports the new flag bits 'FNM\_LEADING\_DIR' and 'FNM\_CASEFOLD'. 'FNM\_LEADING\_DIR' lets a pattern like 'foo\*' match a name like 'foo/bar'. 'FNM\_CASEFOLD' says to ignore case in matching.
- \* 'mkstemp' is a traditional Unix function to atomically create and open a uniquely-named temporary file.

#### Version 1.05

- \* The standard location for the file that says what the local timezone is has changed again. It is now '/usr/local/etc/localtime' (or more precisely, '\${prefix}/etc/localtime') rather than '/etc/localtime'.
- \* The distribution no longer contains any files with names longer than 14 characters.
- \* 'struct ttyent' has two new flag bits: TTY\_TRUSTED and TTY\_CONSOLE. These are set by the new 'trusted' and 'console' keywords in '/etc/ttys'.
- \* New functions 'ttyslot' and 'syslog' from 4.4 BSD.

#### Version 1.04

- \* The configuration process has changed quite a bit. The 'configure' script is now used just like the configuration scripts for other GNU packages. The 'sysdeps' directory hierarchy is much rearranged. The file 'INSTALL' explains the new scheme in detail.

- \* The header files no longer need to be processed into ANSI C and traditional C versions. There is just one set of files to install, and it will work with ANSI or old C compilers (including 'gcc -traditional').
- \* Brendan Kehoe and Ian Lance Taylor have ported the library to the MIPS DECStation running Ultrix 4.
- \* The Sun 4 startup code (crt0) can now properly load SunOS 4 shared libraries. Tom Quinn contributed the initial code. The GNU C library can NOT yet be made itself into a shared library.
- \* Yet further improved support for the i386, running 4.3 BSD-like systems (such as Mach 3 with the Unix single-server), or System V.
- \* New function 'strncasecmp' to do case-insensitive string comparison with limited length.
- \* New function 'strsep' is a reentrant alternative to 'strtok'.
- \* New functions 'scandir' and 'alphasort' for searching directories.
- \* New function 'setenv' is a better interface to 'putenv'.
- \* Ian Lance Taylor has contributed an implementation of the SVID 'ftw' function for traversing a directory tree.
- \* The GNU obstack package is now also part of the C library. The new function 'open\_obstack\_stream' creates a stdio stream that writes onto an obstack; 'obstack\_printf' and 'obstack\_vprintf' do formatted output directly to an obstack.
- \* Miscellaneous new functions: reboot, nice, sigaltstack (4.4 BSD only), cfmakeraw, getusershell, getpass, swab, getttyent, seteuid, setegid.
- \* 'FNM\_FILE\_NAME' is another name for 'FNM\_PATHNAME', used with 'fnmatch'.
- \* The new functions 'strfry' and 'memfrob' do mysterious and wonderful things to your strings.
- \* There are some new test programs: test-fseek, testmb, and testrand.
- \* Some work has been done to begin porting the library to 4.4 BSD and Linux. These ports are not finished, but are a good starting place for really supporting those systems.
- \* '/etc/localtime' is now the standard location for the file that says what the local timezone is, rather than '/usr/local/lib/zoneinfo/localtime'. This follows the general principle that '/etc' is the place for all local configuration files.
- \* The C library header files now use 'extern "C"' when used by the C++ compiler, so the C library should now work with C++ code.
- \* The header file <bstring.h> is gone. <string.h> now declares bcopy, bcmp, bzero, and bbs. (Update: nowadays these functions are declared in <strings.h>.)
- \* Mike Haertel (of GNU e?grep and malloc fame) has written a new sorting function which uses the 'merge sort' algorithm, and is said to be

significantly faster than the old GNU 'qsort' function. Merge sort is now the standard 'qsort' function. The new algorithm can require a lot of temporary storage; so, the old sorting function is called when the required storage is not available.

- \* The C library now includes Michael Glad's Ultra Fast Crypt, which provides the Unix 'crypt' function, plus some other entry points.
- \* The code and header files taken from 4.4 BSD have been updated with the latest files released from Berkeley.

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Local variables:  
version-control: never  
End:

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