NEWS for R version 4.5.2 Patched (2026-01-31 r89374)

NEWS *R News*

LATER NEWS

- News for R 3.0.0 and later can be found in file 'NEWS.Rd' in the R sources and files 'NEWS' and 'doc/html/NEWS.html' in an R build.

CHANGES IN R VERSION 2.15.3

NEW FEATURES:

- `lgamma(x)` for very small `x` (in the denormalized range) is no longer `Inf` with a warning.
- `image()` now sorts an unsorted `breaks` vector, with a warning.
- The internal methods for `tar()` and `untar()` do a slightly more general job for 'ustar'-style handling of paths of more than 100 bytes.
- Packages **compiler** and **parallel** have been added to the reference index ('refman.pdf').
- `untar(tar = "internal")` has some support for `pax` headers as produced by e.g. `gnutar --posix` (which seems prevalent on OpenSUSE 12.2) or `bsdtar --format pax`, including long path and link names.
- `sQuote()` and `dQuote()` now handle 0-length inputs. (Suggestion of Ben Bolker.)
- `summaryRprof()` returns zero-row data frames rather than throw an error if no events are recorded, for consistency.
- The included version of PCRE has been updated to 8.32.
- The **tcltk** namespace can now be re-loaded after unloading.
  The Tcl/Tk event loop is inhibited in a forked child from package **parallel** (as in e.g. `mclapply()`).
- `parallel::makeCluster()` recognizes the value '`random`' for the environment variable `R_PARALLEL_PORT`: this chooses a random value for the port and reduces the chance of conflicts when multiple users start a cluster at the same time.

UTILITIES:

- The default for `TAR` on Windows for `R CMD build` has been changed to be '`internal`' if no `tar` command is on the path.
  This enables most packages to be built 'out of the box' without `Rtools`: the main exceptions are those which need to be installed to re-build vignettes and need `Rtools` for installation (usually because they contain compiled code).

C-LEVEL FACILITIES:

- On a 64-bit Windows platform with enough RAM, `R_alloc` can now allocate up to just under 32GB like other 64-bit platforms.

DEPRECATED AND DEFUNCT:

- Use of `col2rgb(0)` is deprecated (see the help page for its limitations).
- The deprecated `intensities` component returned by `hist()` is no longer recognized by the `plot()` method and will be removed in R 3.0.0.
- `real()`, `as.real()` and `is.real()` are now formally deprecated and give a warning.
- This is formal notice that the non-API EISPACK entry points in R will be removed shortly.

INSTALLATION:

- The `configure` tests for Objective C and Objective C++ now work on Mac OS 10.8 with Xcode 4.5.2 (PR#15107).
- The cairo-based versions of `X11()` now work with current versions of cairographics (e.g., 1.12.10). (PR#15168)
  A workaround for earlier versions of R is to use `X11.options(type = "nbcairo")`.
- Configuration and `R CMD javareconf` now come up with a smaller set of library paths for Java on Oracle-format JDK (including OpenJDK). This helps avoid conflicts between libraries (such as `libjpeg`) supplied in the JDK and system libraries. This can always be overridden if needed: see the 'R Installation and Administration' manual.

BUG FIXES:

- `beta(a, b)` could overflow to infinity in its calculations when one of `a` and `b` was less than one. (PR#15075)
- `lbeta(a, b)` no longer gives `NaN` if `a` or `b` is very small (in the denormalized range).
- `bquote()` is now able to substitute default arguments in single-argument functions. (PR#15077)
- `browseEnv(html = FALSE)` would segfault if called from R (not `R.app`) on a CRAN-style Mac OS X build of R.
- '`[[<-`' for lists (generic vectors) needed to increment `NAMED` count when RHS is used more than once. (PR#15098)
- On Windows, warnings about opening a file or pipe with a non-ASCII description were sometimes output in UTF-8 rather than in the current locale's character set.
- The `call()` function did not duplicate its arguments. (PR#15115)
- `TukeyHSD()` could give `NA` results with some '`na.action`' methods such as `na.exclude()`. (Hinted at on R-help by John Fox.)
- The deprecated `svd(X, LINPACK = TRUE)` could alter `X` in R 2.15.[12]. (Reported by Bill Dunlap.)
- Under Windows, `file.link()` and `file.symlink()` used the link name twice, so would always fail. (Reported by Rui Barradas/Oliver Soong).
- `summaryRprof(memory = "both")` mixed up the units of Vcells and Ncells: it now works in bytes. (PR#15138)

- `tools::Rd2HTML()` would sometimes delete text. (PR#15134)
- `plot()` failed for `"table"` objects containing just one entry. (PR#15118)
- `embedFonts()` needed to quote some filepaths. (PR#15149)
- `parallel::mccollect()` handled `NULL` returns incorrectly (removing the element rather than setting it to `NULL`).
- The full reference index (‘`fullrefman.pdf`’) was missing packages **compiler** and **parallel**.
- The report for `optim(method = "L-BFGS-B", control = list(trace = 1))` reported the last completed and not the current iteration, unlike other methods and trace levels. (PR#15103)
- `qt(1e-12, 1.2)` no longer gives `NaN`.
- `dt(1e160, 1.2, log=TRUE)` no longer gives `-Inf`.
- On Windows the `untar()` function now quotes the directory name when using an external `tar` utility, so `R CMD check` will handle pathnames containing spaces.
- The version for Windows 8 and Windows Server 2012 is now displayed by `win.version()`. (Reported by Gabor Grothendieck.)
- The custom Windows installer target `myR` in the installer ‘`Makefile`’ did not work in 2.15.2. (Reported by Erich Neuwirth.)
- `aperm(matrix(1:6, 2, dimnames=list(A={}, B={})), "A")` no longer segfaults.
- Expressions involving user defined operators were not always deparsed faithfully. (PR#15179)
- The `enc2utf8()` function converted `NA_character_` to `"NA"` in non-UTF-8 locales. (PR#15201)
- The `exclude` argument to `xtabs()` was ignored for `"factor"` arguments.
- On Windows, work around an event-timing problem when the RGui console was closed from the ‘X’ control and the closure cancelled. (This would on some 64-bit systems crash R, typically those with a slow GPU relative to the CPU.)
- On unix `Rscript` will pass the `r_arch` setting it was compiled with on to the R process so that the architecture of `Rscript` and that of R will match unless overridden.
- On Windows, `basename()`, `dirname()` and `file.choose()` have more support for long non-ASCII file names with 260 or more bytes when expressed in UTF-8.

CHANGES IN R VERSION 2.15.2

NEW FEATURES:

- The `X11()` window gains an icon: the latter may be especially useful on Ubuntu’s ‘Unity’ interface.
  The `WM_CLASS` should be set in circumstances where the Window Manager failed to make use of X11 resource settings.
  (Contributed by Philip Johnson.)
- The `"Date"` and `"POSIXt"` methods for `cut()` will accept an unsorted `breaks` argument (as the default method does, although this was undocumented). (Wish of PR#14961.)
- Reference class methods (in the **methods** package) that use other methods in an indirect way (e.g., by `sapply()`) must tell the code analysis to include that method. They can now do so by invoking `$usingMethods()`.
- More Polish translations are available: for the `RGui` menus and for several recommended packages.

- Multistratum MANOVA works. In fact, it seems to have done so for years in spite of the help page claiming it did not.
- `qqline()` has new optional arguments `distribution`, `probs` and `qtype`, following the example of **lattice**'s `panel.qqmathline()`.
- The handling of single quotes in the `en@quot` pseudo-language has been slightly improved. Double quotes are no longer converted.
- New functions `checkPoFiles()` and `checkPoFile()` have been added to the **tools** package to check for consistency of format strings in translation files.
- `model.matrix(~1, ...)` now also contains the same rownames that less trivial formulae produce. (Wish of PR#14992, changes the output of several packages.)
- Misuse of `rep()` on undocumented types of objects (e.g., calls) is now reported as an error.
- The included LAPACK has been updated to 3.4.1, with some patches from the current SVN sources. (*Inter alia*, this resolves PR#14692.)
- `file.copy(recursive = TRUE)` has some additional checks on user error leading to attempted infinite recursion (and on some platforms to crashing R).
- PCRE has been updated to version 8.31, a bug-fix release.
- The included version of `liblzma` has been updated to version 5.0.4, a minor bug-fix release.
- New function `.bincode()`, a 'bare-bones' version of `cut.default(labels = FALSE)` for use in packages with `image()` methods.
- The HTML manuals now use directional single quotes.
- `maintainer()` now converts embedded new lines to spaces. It no longer gives a non-obvious error for non-installed packages.
- The `X11()` device has some protection against being used with forked processes *via* package **parallel**.
- Setting the environment variable `R_OSX_VALGRIND` (to any value) allows R to be run under `valgrind` on Mac OS 10.6 and 10.7 (`valgrind` currently has very limited support for 10.8), provided `system()` is not used (directly or indirectly). This should not be needed for `valgrind` >= 3.8.1.
- The `model.frame()` method for `"lm"` uses `xlevels`: this is safer if `data` was supplied or `model = FALSE` was used and the levels of factors used in the fit had been re-ordered since fitting.
  Similarly, `model.frame(fm, data=<data>)` copies across the variables used for safe prediction from the fit.
- Functions such as `parLapply()` in package **parallel** can make use of a default cluster if one is set. (Reported by Martin Morgan.)
- `chol(pivot = TRUE, LINPACK = FALSE)` is now available using LAPACK 3.2 subroutine `DPSTRF`.
- The functions `.C()`, `.Call()`, `.External()` and `.Fortran()` now check that they are called with an unnamed first argument: the formal arguments were changed from `name=` to `.NAME=` in R 2.13.0, but some packages were still using the old name. This is currently a warning, but will be an error in future.
- `step()` no longer tries to improve a model with AIC of `-Inf` (a perfect fit).
- `spline()` and `splinefun()` gain a new method `"hyman"`, an implementation of Hyman's method of constructing monotonic interpolation splines. (Based on contributions of Simon Wood and Rob Hyndman.)
- On Windows, the C stack size has been increased to 64MB (it has been 10MB since the days of 32MB RAM systems).

PERFORMANCE IMPROVEMENTS:

- `array()` is now implemented in C code (for speed) when `data` is atomic or an unclassed list (so it is known that `as.vector(data)` will have no class to be used by `rep()`).
- `rep()` is faster and uses less memory, substantially so in some common cases (e.g., if `times` is of length one or `length.out` is given, and `each = 1`).
- `findInterval()`, `tabulate()`, `cut()`, `hist()` and `image.default()` all use `.Call()` and are more efficient.
- `duplicated()`, `unique()` and similar now support vectors of lengths above 2^{29} on 64-bit platforms.
- Omitting `PACKAGE` in `.C()` etc calls was supposed to make use of the DLL from the namespace within which the enclosing function was defined. It was less successful in doing so than it might be, and gave no indication it had failed.
  A new search strategy is very successful and gives a warning when it fails. In most cases this is because the entry point is not actually provided by that package (and so `PACKAGE` should be used to indicate which package is intended) but in some the namespace does not have a DLL specified by a `useDynLib()` directive so `PACKAGE` is required.

UTILITIES:

- `R CMD check` now checks if a package can be loaded by `library(pkgname, lib.loc = "somewhere")` without being on the library search path (unless it is already installed in `.Library`, when it always will be).
- `R CMD check --as-cran` notes 'hidden' files and directories (with names starting with a dot) that are not needed for the operation of `R CMD INSTALL` or `R CMD build`: such files should be excluded from the published tarball.
- `R CMD check` (if checking subdirectories) checks that the R code in any demos is ASCII and can be parsed, and warns if not.
- When `R CMD Rd2pdf` is used with '`inputenx.sty`', it allows further characters (mainly for Eastern European languages) by including '`ix-utf8enc.dfu`' (if available). (Wish of PR#14989.)
- `R CMD build` now omits several types of hidden files/directories, including '`inst/doc/.Rinstignore`', '`vignettes/.Rinstignore`', ('`.Rinstignore`' should be at top level), '`.deps`' under '`src`', '`.Renviron`', '`.Rprofile`', '`.Rproj.user`', '`.backups`', '`.cvsignore`', '`.cproject`', '`.directory`', '`.dropbox`', '`.exrc`', '`.gdb.history`', '`.gitattributes`', '`.gitignore`', '`.gitmodules`', '`.hgignore`', '`.hgtags`', '`.htaccess`', '`.latex2html-init`', '`.project`', '`.seed`', '`.settings`', '`.tm_properties`' and various leftovers.
- `R CMD check` now checks for `.C()`, `.Call()`, `.External()` and `.Fortran()` calls in other packages, and gives a warning on those found from R itself (which are not part of the API and change without notice: many will be changed for R 3.0.0).

C-LEVEL FACILITIES:

- The limit for `R_alloc` on 64-bit platforms has been raised to just under 32GB (from just under 16GB).
- The misuse of `.C("name", ..., PACKAGE = foo)` where `foo` is an arbitrary R object is now an error.
  The misuse `.C("name",..., PACKAGE = "")` is now warned about in `R CMD check`, and will be an error in future.

DEPRECATED AND DEFUNCT:

- Use of `array()` with a 0-length `dim` argument is deprecated with a warning (and was contrary to the documentation).
- Use of `tapply()` with a 0-length `INDEX` list is deprecated with a warning.
- '`Translation`' packages are deprecated.
- Calling `rep()` or `rep.int()` on a pairlist is deprecated and will give a warning. In any case, `rep()` converted a pairlist to a list so you may as well do that explicitly.
- Entry point `rcont2` is no longer part of the API, and will move to package **stats** in R 3.0.0.
- The 'internal' graphics device invoked by `.Call("R_GD_nullDevice", package = "grDevices")` is about to be removed: use `pdf(file = NULL)` instead.
- `eigen(EISPACK = TRUE)`, `chol(pivot = FALSE, LINPACK = TRUE)`, `chol2inv(LINPACK = TRUE)`, `solve(LINPACK = TRUE)` and `svd(LINPACK = TRUE)` are deprecated and give a warning.
  They were provided for compatibility with R 1.7.0 (Mar 2003)!
- The 'internal function' `kappa.tri()` has been renamed to `.kappa_tri()` so it is not inadvertently called as a method for class `"tri"`.
- Functions `sessionData()` and `browseAll()` in package **methods** are on a help page describing them as 'deprecated' and are now formally deprecated.

PACKAGE INSTALLATION:

- For a Windows or Mac OS X binary package install, `install.packages()` will check if a source package is available on the same repositories, and report if it is a later version or there is a source package but no binary package available.
  This check can be suppressed: see the help page.
- `install.packages(type = "both")` has been enhanced. In interactive use it will ask whether to choose the source version of a package if the binary version is older and contains compiled code, and also asks if source packages with no binary version should be installed.

INSTALLATION:

- There is a new `configure` option '`--with-libtiff`' (mainly in case the system installation needs to be avoided).
- LAPACK 3.4.1 does use some Fortran 90 features, so `g77` no longer suffices.
- If an external LAPACK is used, it must be version 3.2 or later.

BUG FIXES:

- On Windows, starting `Rterm` via `R.exe` caused Ctrl-C to misbehave. (PR#14948)
- The `tools::latexToUtf8()` function missed conversions that were contained within braces.
- Long timezone specifications (such as a file name preceded by `:`) could crash `as.POSIXlt`. (PR#14945)
- `R CMD build --resave-data` could fail if there was no '`data`' directory but there was an '`R/sysdata.rda`' file. (PR#14947)
- `is.na()` misbehaved on a 0-column data frame. (PR#14959)
- `anova.lmlist()` failed if `test` was supplied. (PR#14960)
  It was unable to compute Cp tests for object of class `"lm"` (it assumed class `"glm"`).
- The `formula` method for `sunflowerplot()` now allows `xlab` and `ylab` to be set. (Reported by Gerrit Eichner.)
- The `"POSIXt"` and `"Date"` methods for `hist()` could fail on Windows where adjustments to the right-hand boundary crossed a DST transition time.

- On Windows, the code in `as.POSIXct()` to handle incorrectly specified `isdst` fields might have resulted in `NA` being returned.
- `aov()` and `manova()` gave spurious warning about singular error model in the multiresponse case.
- In `ns()` and `bs()`, specifying `knots = NULL` is now equivalent to omitting it, also when `df` is specified. (PR#14970)
- `sprintf()` did not accept numbered arguments ending in zero. (PR#14975)
- `rWishart()` could overflow the C stack and maybe crash the R process for dimensions of several hundreds or more. (Reported by Michael Braun on R-sig-mac.)
- Base package vignettes (e.g., `vignette("Sweave")`) were not fully installed in builds of R from the tarball.
- `lchoose()` and `choose()` could overflow the C stack and crash R.
- When given a 0-byte file and asked to keep source references, `parse()` read input from `stdin()` instead.
- `pdf(compress = TRUE)` did not delete temporary files it created until the end of the R session. (PR#14991)
- `logLik()` did not detect the error of applying it to a multiple-response linear model. (PR#15000)
- `file.copy(recursive = TRUE)` did not always report `FALSE` for a failure two or more directories deep.
- `qgeom()` could return `-1` for extremely small `q`. (PR#14967)
- `smooth.spline()` used `DUP = FALSE` which allowed its compiled C code to change the function: this was masked by the default byte-compilation. (PR#14965)
- In Windows, the GUI preferences for foreground color were not always respected. (Reported by Benjamin Wells.)
- On OS X, the Quartz versions of the bitmap devices did not respect `antialias = "none"`. (PR#15006)
- `unique()` and similar would infinite-loop if called on a vector of length $> 2^{29}$ (but reported that the vector was too long for 2^{30} or more).
- `parallel::stopCluster()` now works with MPI clusters without **snow** being on the search path.
- `terms.formula()` could exhaust the stack, and the stack check did not always catch this before the segfault. (PR#15013)
- `sort.list(method = "radix")` could give incorrect results on certain compilers (seen with `clang` on Mac OS 10.7 and `Xcode 4.4.1`).
- `backsolve(T, b)` gave incorrect results when `nrows(b) > ncols(T)` and `b` had more than one column.
  It could segfault or give nonsense if `k` was specified as more than `ncols(T)`.
- `smooth.spline()` did not check that a specified numeric `spar` was of length 1, and gave corrupt results if it was of length 0.
- Protection added to `do_system`. (PR#15025)
- Printing of vectors with names $>$ 1000 characters now works correctly rather than truncating. (PR#15028)
- `qr()` for a complex matrix did not pivot the column names.
- `--with-blas='-framework vecLib'` now also works on OS X 10.8.
- `R CMD check` no longer fails with an error if a 'DESCRIPTION' file incorrectly contains a blank line. (Reported by Bill Dunlap.)
- `install.packages(type = "both")` could call `chooseCRANmirror()` twice.

- `lm.wfit()` could segfault in R 2.15.1 if all the weights were zero. (PR#15044)
- A malformed package name could cause `R CMD INSTALL` to write outside the target library.
- Some of the quality control functions (e.g., `tools::checkFF()`) were wrongly identifying the source of S4 methods in a package and so not checking them.
- The default type of display by `browseEnv()` when using `R.app` on Mac OS X has been incorrect for a long time.
- The implementation of `importMethodsFrom` in a `NAMESPACE` file could be confused and fail to find generics when importing from multiple packages (reported and fixed by Michael Lawrence).
- The detection of the C stack direction is better protected against compiler optimization. (PR#15011)
- Long custom line types would sometimes segfault on the cairographics-based devices. (PR#15055)
- `tools::checkPoFile()` unprotected too early in its C code and so segfaulted from time to time.
- The Fortran code underlying `nlminb()` could infinite-loop if any of the input functions returned `NA` or `NaN`. This is now an error for the gradient or Hessian, and a warning for the function (with the value replaced by `Inf`). (In part, PR#15052.)
- The code for creating `coerce()` methods could generate false notes about ambiguous selection; the notes have been suppressed for this function.
- `arima.sim()` could give too long an output in some corner cases (in part, PR#15068).
- `anova.glm()` with `test = "Rao"` didn't work when models included an offset. (Reported by Søren Feodor Nielsen.)
- `as.data.frame.matrix()` could return invalid data frame with no `row.names` attribute for 0-row matrix. (Reported by Hervé Pagès.)
- Compilation with the `vecLib` or `Accelerate` frameworks on OS X without using that also for LAPACK is more likely to be successful.

CHANGES IN R VERSION 2.15.1

NEW FEATURES:

- `source()` now uses `withVisible()` rather than `.Internal(eval.with.vis)`. This sometimes alters tracebacks slightly.
- `install.packages("pkg_version.tgz")` on Mac OS X now has sanity checks that this is actually a binary package (as people have tried it with incorrectly named source packages).
- `splineDesign()` and `spline.des()` in package **splines** have a new option `sparse` which can be used for efficient construction of a sparse B-spline design matrix (*via* **Matrix**).
- `norm()` now allows `type = "2"` (the 'spectral' or 2-norm) as well, mainly for didactical completeness.
- `pmin()` and `pmax()` now also work when one of the inputs is of length zero and others are not, returning a zero-length vector, analogously to, say, `+`.
- `colorRamp()` (and hence `colorRampPalette()`) now also works for the boundary case of just one color when the ramp is flat.
- `.C()` gains some protection against the misuse of character vector arguments. (An all too common error is to pass `character(N)`, which initializes the elements to `""`, and then attempt to edit the strings in-place, sometimes forgetting to terminate them.)

- Calls to the new function `globalVariables()` in package **utils** declare that functions and other objects in a package should be treated as globally defined, so that `CMD check` will not note them.
- `print(packageDescription(*))` trims the `Collate` field by default.
- The included copy of `zlib` has been updated to version 1.2.7.
- A new option `"show.error.locations"` has been added. When set to `TRUE`, error messages will contain the location of the most recent call containing source reference information. (Other values are supported as well; see `?options`.)
- The NA warning messages from e.g. `pchisq()` now report the call to the closure and not that of the `.Internal`.
- Added Polish translations by Łukasz Daniel.

PERFORMANCE IMPROVEMENTS:

- In package **parallel**, `makeForkCluster()` and the multicore-based functions use native byte-order for serialization (deferred from 2.15.0).
- `lm.fit()`, `lm.wfit()`, `glm.fit()` and `lsfit()` do less copying of objects, mainly by using `.Call()` rather than `.Fortran()`.
- `.C()` and `.Fortran()` do less copying: arguments which are raw, logical, integer, real or complex vectors and are unnamed are not copied before the call, and (named or not) are not copied after the call. Lists are no longer copied (they are supposed to be used read-only in the C code).
- `tabulate()` makes use of `.C(DUP = FALSE)` and hence does not copy `bin`. (Suggested by Tim Hesterberg.) It also avoids making a copy of a factor argument `bin`.
- Other functions (often or always) doing less copying include `cut()`, `dist()`, the complex case of `eigen()`, `hclust()`, `image()`, `kmeans()`, `loess()`, `stl()` and `svd(LINPACK = TRUE)`.
- There is less copying when using primitive replacement functions such as `names()`, `attr()` and `attributes()`.

DEPRECATED AND DEFUNCT:

- The converters for use with `.C()` (see `?getCConverterDescriptions`) are deprecated: use the `.Call()` interface instead. There are no known examples (they were never fully documented).

UTILITIES:

- For `R CMD check`, a few people have reported problems with junctions on Windows (although they were tested on Windows 7, XP and Server 2008 machines and it is unknown under what circumstances the problems occur). Setting the environment variable `R_WIN_NO_JUNCTIONS` to a non-empty value (e.g., in '`~/.R/check.Renviron`') will force copies to be used instead.

INSTALLATION:

- `R CMD INSTALL` with `_R_CHECK_INSTALL_DEPENDS_` set to a true value (as done by `R CMD check --as-cran`) now restricts the packages available when lazy-loading as well as when test-loading (since packages such as **ETLUtils** and **agsemisc** had top-level calls to `library()` for undeclared packages).
  This check is now also available on Windows.

C-LEVEL FACILITIES:

- C entry points `mkChar` and `mkCharCE` now check that the length of the string they are passed does not exceed $2^{31} - 1$ bytes: they used to overflow with unpredictable consequences.
- C entry points `R_GetCurrentSrcref` and `R_GetSrcFilename` have been added to the API to allow debuggers access to the source references on the stack.

WINDOWS-SPECIFIC CHANGES:

- Windows-specific changes will now be announced in this file ('`NEWS`'). Changes up and including R 2.15.0 remain in the '`CHANGES`' file.
- There are two new environment variables which control the defaults for command-line options.
  If `R_WIN_INTERNET2` is set to a non-empty value, it is as if '`--internet2`' was used.
  If `R_MAX_MEM_SIZE` is set, it gives the default memory limit if '`--max-mem-size`' is not specified: invalid values being ignored.

BUG FIXES:

- `lsfit()` lost the names from the residuals.
- More cases in which `merge()` could create a data frame with duplicate column names now give warnings. Cases where names specified in `by` match multiple columns are errors.
- Nonsense uses such as `seq(1:50, by = 5)` (from package **plotrix**) and `seq.int(1:50, by = 5)` are now errors.
- The residuals in the 5-number summary printed by `summary()` on an `"lm"` object are now explicitly labelled as weighted residuals when non-constant weights are present. (Wish of PR#14840.)
- `tracemem()` reported that all objects were copied by `.C()` or `.Fortran()` whereas only some object types were ever copied.
  It also reported and marked as copies *some* transformations such as `rexp(n, x)`: it no longer does so.
- The `plot()` method for class `"stepfun"` only used the optional `xval` argument to compute `xlim` and not the points at which to plot (as documented). (PR#14864)
- Names containing characters which need to be escaped were not deparsed properly. (PR#14846)
- Trying to update (recommended) packages in '`R_HOME/library`' without write access is now dealt with more gracefully. Further, such package updates may be skipped (with a warning), when a newer installed version is already going to be used from `.libPaths()`. (PR#14866)
- `hclust()` is now fast again (as up to end of 2003), with a different fix for the "median"/"centroid" problem. (PR#4195).
- `get_all_vars()` failed when the data came entirely from vectors in the global environment. (PR#14847)
- `R CMD check` with `_R_CHECK_NO_RECOMMENDED_` set to a true value (as done by the `--as-cran` option) could issue false errors if there was an indirect dependency on a recommended package.
- `formatC()` uses the C entry point `str_signif` which could write beyond the length allocated for the output string.
- Missing default argument added to implicit S4 generic for `backsolve()`. (PR#14883)
- Some bugs have been fixed in handling load actions that could fail to export assigned items or generate spurious warnings in `CMD check` on loading.

- For `tiff(type = "windows")`, the numbering of per-page files except the last was off by one.
- On Windows, loading package **stats** (which is done for a default session) would switch line endings on '`stdout`' and '`stderr`' from CRLF to LF. This affected `Rterm` and `R CMD BATCH`.
- On Windows, the compatibility function `x11()` had not kept up with changes to `windows()`, and issued warnings about bad parameters. (PR#14880)
- On Windows, the `Sys.glob()` function did not handle UNC paths as it was designed to try to do. (PR#14884)
- In package **parallel**, `clusterApply()` and similar failed to handle a (pretty pointless) length-1 argument. (PR#14898)
- Quartz Cocoa display reacted asynchronously to `dev.flush()` which means that the redraw could be performed after the plot has been already modified by subsequent code. The redraw is now done synchronously in `dev.flush()` to allow animations without sleep cycles.
- Source locations reported in `traceback()` were incorrect when byte-compiled code was on the stack.
- `plogis(x, lower = FALSE, log.p = TRUE)` no longer underflows early for large x (e.g., 800).
- `?Arithmetic`'s "`1 ^ y` and `y ^ 0` are `1`, *always*" now also applies for `integer` vectors `y`.
- X11-based pixmap devices like `png(type = "Xlib")` were trying to set the cursor style, which triggered some warnings and hangs.
- Code executed by the built-in HTTP server no longer allows other HTTP clients to re-enter R until the current worker evaluation finishes, to prevent cascades.
- The `plot()` and `Axis()` methods for class `"table"` now respect graphical parameters such as `cex.axis`. (Reported by Martin Becker.)
- Under some circumstances `package.skeleton()` would give out progress reports that could not be translated and so were displayed by question marks. Now they are always in English. (This was seen for CJK locales on Windows, but may have occurred elsewhere.)
- The evaluator now keeps track of source references outside of functions, e.g. when `source()` executes a script.
- The replacement method for `window()` now works correctly for multiple time series of class `"mts"`. (PR#14925)
- `is.unsorted()` gave incorrect results on non-atomic objects such as data frames. (Reported by Matthew Dowle.)
- The value returned by `tools::psnice()` for invalid `pid` values was not always `NA` as documented.
- Closing an `X11()` window while `locator()` was active could abort the R process.
- `getMethod(f, sig)` produced an incorrect error message in some cases when `f` was not a string.
- Using a string as a "call" in an error condition with `options(showErrorCalls=TRUE)` could cause a segfault. (PR#14931)
- The string `"infinity"` allowed by C99 was not accepted as a numerical string value by e.g. `scan()` and `as.numeric()`. (PR#14933)
- In `legend()`, setting some entries of `lwd` to `NA` was inconsistent (depending on the graphics device) in whether it would suppress those lines; now it consistently does so. (PR#14926)

- `by()` failed for a zero-row data frame. (Reported by Weiqiang Qian.)
- The Yates' correction in `chisq.test()` could be bigger than the terms it corrected, previously leading to an infinite test statistic in some corner cases which are now reported as `NaN`.
- `xgettext()` and related functions sometimes returned items that were not strings for translation. (PR#14935)
- `plot(<lm>, which=5)` now correctly labels the factor level combinations for the special case where all h_{ii} are the same. (PR#14837)
- `Sys.glob()` caused a segfault if the first element of `path` was `NA_character`. (PR#14990)

CHANGES IN R VERSION 2.15.0

SIGNIFICANT USER-VISIBLE CHANGES:

- The behaviour of `unlink(recursive = TRUE)` for a symbolic link to a directory has changed: it now removes the link rather than the directory contents (just as `rm -r` does).
  On Windows it no longer follows reparse points (including junctions and symbolic links).

NEW FEATURES:

- Environment variable `RD2DVI_INPUTENC` has been renamed to `RD2PDF_INPUTENC`.
- `.Deprecated()` becomes a bit more flexible, getting an `old` argument.
- Even data-only packages without R code need a namespace and so may need to be installed under R 2.14.0 or later.
- `assignInNamespace()` has further restrictions on use apart from at top-level, as its help page has warned. Expect it to be disabled from programmatic use in the future.
- `system()` and `system2()` when capturing output report a non-zero status in the new `"status"` attribute.
- `kronecker()` now has an S4 generic in package **methods** on which packages can set methods. It will be invoked by `X %x% Y` if either `X` or `Y` is an S4 object.
- `pdf()` accepts forms like `file = "|lpr"` in the same way as `postscript()`.
- `pdf()` accepts `file = NULL`. This means that the device does NOT create a PDF file (but it can still be queried, e.g., for font metric info).
- `format()` (and hence `print()`) on `"bibentry"` objects now uses `options("width")` to set the output width.
- `legend()` gains a `text.font` argument. (Suggested by Tim Paine, PR#14719.)
- `nchar()` and `nzchar()` no longer accept factors (as integer vectors). (Wish of PR#6899.)
- `summary()` behaves slightly differently (or more precisely, its `print()` method does). For numeric inputs, the number of NAs is printed as an integer and not a real. For dates and datetimes, the number of NAs is included in the printed output (the latter being the wish of PR#14720).
  The `"data.frame"` method is more consistent with the default method: in particular it now applies `zapsmall()` to numeric/complex summaries.
- The number of items retained with `options(warn = 0)` can be set by `options(nwarnings=)`.
- There is a new function `assignInMyNamespace()` which uses the namespace of the function it is called from.

- `attach()` allows the default name for an attached file to be overridden.
- `bxp()`, the work horse of `boxplot()`, now uses a more sensible default `xlim` in the case where `at` is specified differently from `1:n`, see the discussion on R-devel, https://stat.ethz.ch/pipermail/r-devel/2011-November/062586.html.
- New function `paste0()`, an efficient version of `paste(*, sep="")`, to be used in many places for more concise (and slightly more efficient) code.
- Function `setClass()` in package **methods** now returns, invisibly, a generator function for the new class, slightly preferred to calling `new()`, as explained on the `setClass` help page.
- The `"dendrogram"` method of `str()` now takes its default for `last.str` from option `str.dendrogram.last`.
- New simple `fitted()` method for `"kmeans"` objects.
- The `traceback()` function can now be called with an integer argument, to display a current stack trace. (Wish of PR#14770.)
- `setGeneric()` calls can be simplified when creating a new generic function by supplying the default method as the `def` argument. See `?setGeneric`.
- `serialize()` has a new option `xdr = FALSE` which will use the native byte-order for binary serializations. In scenarios where only little-endian machines are involved (these days, close to universal) and (un)serialization takes an appreciable amount of time this may speed up noticeably transferring data between systems.
- The internal (un)serialization code is faster for long vectors, particularly with XDR on some platforms. (Based on a suggested patch by Michael Spiegel.)
- For consistency, circles with zero radius are omitted by `points()` and `grid.circle()`. Previously this was device-dependent, but they were usually invisible.
- `NROW(x)` and `NCOL(x)` now work whenever `dim(x)` looks appropriate, e.g., also for more generalized matrices.
- PCRE has been updated to version 8.30.
- The internal `R_Srcref` variable is now updated before the browser stops on entering a function. (Suggestion of PR#14818.)
- There are 'bare-bones' functions `.colSums()`, `.rowSums()`, `.colMeans()` and `.rowMeans()` for use in programming where ultimate speed is required.
- The formerly internal function `.package_dependencies()` from package **tools** for calculating (recursive) (reverse) dependencies on package databases has been renamed to `package_dependencies()` and is now exported.
- There is a new function `optimHess()` to compute the (approximate) Hessian for an `optim()` solution if `hessian = TRUE` was forgotten.
- `.filled.contour()` is a 'bare-bones' function to add a filled-contour rectangular plot to an already prepared plot region.
- The stepping in debugging and single-step browsing modes has changed slightly: now left braces at the start of the body are stepped over for `if` statements as well as for `for` and `while` statements. (Wish of PR#14814.)
- `library()` no longer warns about a conflict with a function from `package:base` if the function has the same code as the base one but with a different environment. (An example is `Matrix::det()`.)
- When deparsing very large language objects, `as.character()` now inserts newlines after each line of approximately 500 bytes, rather than truncating to the first line.
- New function `rWishart()` generates Wishart-distributed random matrices.
- Packages may now specify actions to be taken when the package is loaded (`setLoadActions()`).

- `options(max.print = Inf)` and similar now give an error (instead of warnings later).
- The `"difftime"` replacement method of `units` tries harder to preserve other attributes of the argument. (Wish of PR#14839.)
- `poly(raw = TRUE)` no longer requires more unique points than the degree. (Requested by John Fox.)

PACKAGE parallel:

- There is a new function `mcmapply()`, a parallel version of `mapply()`, and a wrapper `mcMap()`, a parallel version of `Map()`.
- A default cluster can be registered by the new function `setDefaultCluster()`: this will be used by default in functions such as `parLapply()`.
- `clusterMap()` has a new argument `.scheduling` to allow the use of load-balancing.
- There are new load-balancing functions `parLapplyLB()` and `parSapplyLB()`.
- `makePSOCKCluster()` has a new option `useXDR = FALSE` which can be used to avoid byte-shuffling for serialization when all the nodes are known to be little-endian (or all big-endian).

PACKAGE INSTALLATION:

- Non-ASCII vignettes without a declared encoding are no longer accepted.
- C/C++ code in packages is now compiled with `-NDEBUG` to mitigate against the C/C++ function `assert` being called in production use. Developers can turn this off during package development with `PKG_CPPFLAGS = -UNDEBUG`.
- `R CMD INSTALL` has a new option '`--dsym`' which on Mac OS X (Darwin) dumps the symbols alongside the '`.so`' file: this is helpful when debugging with `valgrind` (and especially when installing packages into '`R.framework`'). [This can also be enabled by setting the undocumented environment variable `PKG_MAKE_DSYM`, since R 2.12.0.]
- `R CMD INSTALL` will test loading under all installed sub-architectures even for packages without compiled code, unless the flag '`--no-multiarch`' is used. (Pure R packages can do things which are architecture-dependent: in the case which prompted this, looking for an icon in a Windows R executable.)
- There is a new option `install.packages(type = "both")` which tries source packages if binary packages are not available, on those platforms where the latter is the default.
- The meaning of `install.packages(dependencies = TRUE)` has changed: it now means to install the essential dependencies of the named packages plus the '`Suggests`', but only the essential dependencies of dependencies. To get the previous behaviour, specify `dependencies` as a character vector.
- `R CMD INSTALL --merge-multiarch` is now supported on OS X and other Unix-alikes using multiple sub-architectures.
- `R CMD INSTALL --libs-only` now by default does a test load on Unix-alikes as well as on Windows: suppress with '`--no-test-load`'.

UTILITIES:

- `R CMD check` now gives a warning rather than a note if it finds inefficiently compressed datasets. With `bzip2` and `xz` compression having been available since R 2.10.0, it only exceptionally makes sense to not use them.
  The environment variable `_R_CHECK_COMPACT_DATA2_` is no longer consulted: the check is always done if `_R_CHECK_COMPACT_DATA_` has a true value (its default).
- Where multiple sub-architectures are to be tested, `R CMD check` now runs the examples and tests for all the sub-architectures even if one fails.

- `R CMD check` can optionally report timings on various parts of the check: this is controlled by environment variable `_R_CHECK_TIMINGS_` documented in 'Writing R Extensions'. Timings (in the style of `R CMD BATCH`) are given at the foot of the output files from running each test and the R code in each vignette.
- There are new options for more rigorous testing by `R CMD check` selected by environment variables – see the 'Writing R Extensions' manual.
- `R CMD check` now warns (rather than notes) on undeclared use of other packages in examples and tests: increasingly people are using the metadata in the '`DESCRIPTION`' file to compute information about packages, for example reverse dependencies.
- The defaults for some of the options in `R CMD check` (described in the 'R Internals' manual) have changed: checks for unsafe and `.Internal()` calls and for partial matching of arguments in R function calls are now done by default.
- `R CMD check` has more comprehensive facilities for checking compiled code and so gives fewer reports on entry points linked into '`.so`'/'`.dll`' files from libraries (including C++ and Fortran runtimes).
  Checking compiled code is now done on FreeBSD (as well as the existing supported platforms of Linux, Mac OS X, Solaris and Windows).
- `R CMD build` has more options for '`--compact-vignettes`': see `R CMD build --help`.
- `R CMD build` has a new option '`--md5`' to add an '`MD5`' file (as done by CRAN): this is used by `R CMD INSTALL` to check the integrity of the distribution.
  If this option is not specified, any existing (and probably stale) '`MD5`' file is removed.

DEPRECATED AND DEFUNCT:

- `R CMD Rd2dvi` is now defunct: use `R CMD Rd2pdf`.
- Options such '`--max-nsize`', '`--max-vsize`' and the function `mem.limits()` are now defunct. (Options '`--min-nsize`' and '`--min-vsize`' remain available.)
- Use of `library.dynam()` without specifying all the first three arguments is now disallowed.
  Use of an argument `chname` in `library.dynam()` including the extension '`.so`' or '`.dll`' (which was never allowed according to the help page) is defunct. This also applies to `library.dynam.unload()` and to `useDynLib` directives in '`NAMESPACE`' files.
- The internal functions `.readRDS()` and `.saveRDS()` are now defunct.
- The off-line `help()` types '`"postscript"`' and '`"ps"`' are defunct.
- `Sys.putenv()`, replaced and deprecated in R 2.5.0, is finally removed.
- Some functions/objects which have been defunct for five or more years have been removed completely. These include `.Alias()`, `La.chol()`, `La.chol2inv()`, `La.eigen()`, `Machine()`, `Platform()`, `Version`, `codes()`, `delay()`, `format.char()`, `getenv()`, `httpclient()`, `loadURL()`, `machine()`, `parse.dcf()`, `printNoClass()`, `provide()`, `read.table.url()`, `restart()`, `scan.url()`, `symbol.C()`, `symbol.For()` and `unix()`.
- The `ENCODING` argument to `.C()` is deprecated. It was intended to smooth the transition to multi-byte character strings, but can be replaced by the use of `iconv()` in the rare cases where it is still needed.

INSTALLATION:

- Building with a positive value of '`--with-valgrind-instrumentation`' now also instruments logical, complex and raw vectors.

C-LEVEL FACILITIES:

- Passing R objects other than atomic vectors, functions, lists and environments to `.C()` is now deprecated and will give a warning. Most cases (especially `NULL`) are actually coding errors. `NULL` will be disallowed in future.
  `.C()` now passes a pairlist as a `SEXP` to the compiled code. This is as was documented, but pairlists were in reality handled differently as a legacy from the early days of R.
- `call_R` and `call_S` are deprecated. They still exist in the headers and as entry points, but are no longer documented and should not be used for new code.

BUG FIXES:

- `str(x, width)` now obeys its `width` argument also for function headers and other objects `x` where `deparse()` is applied.
- The convention for `x %/% 0L` for integer-mode `x` has been changed from `0L` to `NA_integer_`. (PR#14754)
- The `exportMethods` directive in a '`NAMESPACE`' file now exports S4 generics as necessary, as the extensions manual said it does. The manual has also been updated to be a little more informative on this point.
  It is now required that there is an S4 generic (imported or created in the package) when methods are to be exported.
- Reference methods cannot safely use non-exported entries in the namespace. We now do not do so, and warn in the documentation.
- The namespace import code was warning when identical S4 generic functions were imported more than once, but should not (reported by Brian Ripley, then Martin Morgan).
- `merge()` is no longer allowed (in some ways) to create a data frame with duplicate column names (which confused PR#14786).
- Fixes for rendering raster images on X11 and Windows devices when the x-axis or y-axis scale is reversed.
- `getAnywhere()` found S3 methods as seen from the **utils** namespace and not from the environment from which it was called.
- `selectMethod(f, sig)` would not return inherited group methods when caching was off (as it is by default).
- `dev.copy2pdf(out.type = "cairo")` gave an error. (PR#14827)
- Virtual classes (e.g., class unions) had a `NULL` prototype even if that was not a legal subclass. See `?setClassUnion`.
- The C prototypes for `zdotc` and `zdotu` in '`R_ext/BLAS.h`' have been changed to the more modern style rather than that used by `f2c`. (Patch by Berwin Turlach.)
- `isGeneric()` produced an error for primitives that can not have methods.
- `.C()` or `.Fortran()` had a lack-of-protection error if the registration information resulted in an argument being coerced to another type.
- `boxplot(x=x, at=at)` with non finite elements in `x` and non integer `at` could not generate a warning but failed.
- `heatmap(x, symm=TRUE, RowSideColors=*)` no longer draws the colors in reversed order.
- `predict(<ar>)` was incorrect in the multivariate case, for p >= 2.
- `print(x, max=m)` is now consistent when `x` is a `"Date"`; also the "reached ... max.print ..." messages are now consistently using single brackets.
- Closed the '`<li>`' tag in pages generated by `Rd2HTML()`. (PR#14841)
- Axis tick marks could go out of range when a log scale was used. (PR#14833)
- Signature objects in methods were not allocated as S4 objects (caused a problem with `trace()` reported by Martin Morgan).

CHANGES IN R VERSION 2.14.2

NEW FEATURES:

- The internal `untar()` (as used by default by `R CMD INSTALL`) now knows about some `pax` headers which `bsdtar` (e.g., the default `tar` for Mac OS >= 10.6) can incorrectly include in `tar` files, and will skip them with a warning.
- PCRE has been upgraded to version 8.21: as well as bug fixes and greater Perl compatibility, this adds a JIT pattern compiler, about which PCRE's news says 'large performance benefits can be had in many situations'. This is supported on most but not all R platforms.
- Function `compactPDF()` in package **tools** now takes the default for argument `gs_quality` from environment variable `GS_QUALITY`: there is a new value `"none"`, the ultimate default, which prevents GhostScript being used in preference to `qpdf` just because environment variable `R_GSCMD` is set. If `R_GSCMD` is unset or set to `""`, the function will try to find a suitable GhostScript executable.
- The included version of zlib has been updated to 1.2.6.
- For consistency with the `logLik()` method, `nobs()` for `"nls"` files now excludes observations with zero weight. (Reported by Berwin Turlach.)

UTILITIES:

- `R CMD check` now reports by default on licenses not according to the description in 'Writing R Extensions'.
- `R CMD check` has a new option '`--as-cran`' to turn on most of the customizations that CRAN uses for its incoming checks.

PACKAGE INSTALLATION:

- `R CMD INSTALL` will now no longer install certain file types from '`inst/doc`': these are almost certainly mistakes and for some packages are wasting a lot of space. These are '`Makefile`', files generated by running LaTeX, and unless the package uses a '`vignettes`' directory, PostScript and image bitmap files.
  Note that only PDF vignettes have ever been supported: some of these files come from DVI/PS output from the Sweave defaults prior to R 2.13.0.

BUG FIXES:

- R configured with '`--disable-openmp`' would mistakenly set `HAVE_OPENMP` (internal) and `SUPPORT_OPENMP` (in '`Rconfig.h`') even though no OpenMP flags were populated.
- The `getS3method()` implementation had an old computation to find an S4 default method.
- `readLines()` could overflow a buffer if the last line of the file was not terminated. (PR#14766)
- `R CMD check` could miss undocumented S4 objects in packages which used S4 classes but did not '`Depends: methods`' in their '`DESCRIPTION`' file.
- The HTML Help Search page had malformed links. (PR#14769)
- A couple of instances of lack of protection of `SEXP`s have been squashed. (PR#14772, PR#14773)
- `image(x, useRaster=TRUE)` misbehaved on single-column `x`. (PR#14774)
- Negative values for `options("max.print")` or the `max` argument to `print.default()` caused crashes. Now the former are ignored and the latter trigger an error. (PR#14779)

- The text of a function body containing more than 4096 bytes was not properly saved by the parser when entered at the console.
- Forgetting the `#endif` tag in an Rd file could cause the parser to go into a loop. (Reported by Hans-Jorg Bibiko.)
- `str(*, .....,  strict.width="cut")` now also obeys `list.len = n`. (Reported by Sören Vogel.)
- Printing of arrays did not have enough protection (C level), e.g., in the context of `capture.output()`. (Reported by Hervé Pagès and Martin Morgan.)
- `pdf(file = NULL)` would produce a spurious file named 'NA'. (PR#14808)
- `list2env()` did not check the type of its `envir` argument. (PR#14807)
- `svg()` could segfault if called with a non-existent file path. (PR#14790)
- `make install` can install to a path containing '+' characters. (PR#14798)
- The `edit()` function did not respect the `options("keep.source")` setting. (Reported by Cleridy Lennert.)
- `predict.lm(*, type="terms", terms=*, se.fit=TRUE)` did not work. (PR#14817)
- There is a partial workaround for errors in the TRE regular-expressions engine with named classes and repeat counts of at least 2 in a MBCS locale (PR#14408): these are avoided when TRE is in 8-bit mode (e.g., for `useBytes = TRUE` and when all the data are ASCII).
- The C function `R_ReplDLLdo1()` did not call top-level handlers.
- The Quartz device was unable to detect window sessions on Mac OS X 10.7 (Lion) and higher and thus it was not used as the default device on the console. Since Lion any application can use window sessions, so Quartz will now be the default device if the user's window session is active and R is not run via `ssh` which is at least close to the behavior in prior OS X versions.
- `mclapply()` would fail in code assembling the translated error message if some (but not all) cores encountered an error.
- `format.POSIXlt(x)` raised an arithmetic exception when `x` was an invalid object of class `"POSIXlt"` and parts were empty.
- `installed.packages()` has some more protection against package installs going on in parallel.
- `.Primitive()` could be mis-used to call `.Internal()` entry points.

CHANGES IN R VERSION 2.14.1

NEW FEATURES:

- `parallel::detectCores()` is now able to find the number of physical cores (rather than CPUs) on Sparc Solaris.
  It can also do so on most versions of Windows; however the default remains `detectCores(logical = TRUE)` on that platform.
- Reference classes now keep a record of which fields are locked. `$lock()` with no arguments returns the names of the locked fields.
- `HoltWinters()` reports a warning rather than an error for some optimization failures (where the answer might be a reasonable one).
- `tools::dependsOnPkg()` now accepts the shorthand `dependencies = "all"`.
- `parallel::clusterExport()` now allows specification of an environment from which to export.

- The `quartz()` device now does tilde expansion on its `file` argument.
- `tempfile()` on a Unix-alike now takes the process ID into account. This is needed with **multicore** (and as part of **parallel**) because the parent and all the children share a session temporary directory, and they can share the C random number stream used to produce the unique part. Further, two children can call `tempfile()` simultaneously.
- Option `print` in Sweave's `RweaveLatex()` driver now emulates auto-printing rather than printing (which can differ for an S4 object by calling `show()` rather than `print()`).
- `filled.contour()` now accepts infinite values: previously it might have generated invalid graphics files (e.g., containing NaN values).

INSTALLATION:

- On 64-bit Linux systems, `configure` now only sets '`LIBnn`' to `lib64` if '`/usr/lib64`' exists. This may obviate setting '`LIBnn`' explicitly on Debian-derived systems.
  It is still necessary to set '`LIBnn = lib`' (or '`lib32`') for 32-bit builds of R on a 64-bit OS on those Linux distributions capable for supporting that concept.
- `configure` looks for '`inconsolata.sty`', and if not found adjusts the default `R_RD4PDF` to not use it (with a warning, since it is needed for high-quality rendering of manuals).

PACKAGE INSTALLATION:

- `R CMD INSTALL` will now do a test load for all sub-architectures for which code was compiled (rather than just the primary sub-architecture).

UTILITIES:

- When checking examples under more than one sub-architecture, `R CMD check` now uses a separate directory '`examples_arch`' for each sub-architecture, and leaves the output in file '`pkgname-Ex_arch.Rout`'. Some packages expect their examples to be run in a clean directory ....

BUG FIXES:

- `stack()` now gives an error if no vector column is selected, rather than returning a 1-column data frame (contrary to its documentation).
- `summary.mlm()` did not handle objects where the formula had been specified by an expression. (Reported by Helios de Rosario Martinez).
- `tools::deparseLatex(dropBraces=TRUE)` could drop text as well as braces.
- `colormodel = "grey"` (new in R 2.14.0) did not always work in `postscript()` and `pdf()`.
- `file.append()` could return `TRUE` for failures. (PR#14727)
- `gzcon()` connections are no longer subject to garbage collection: it was possible for this to happen when unintended (e.g., when calling `load()`).
- `nobs()` does not count zero-weight observations for `glm()` fits, for consistency with `lm()`. This affects the `BIC()` values reported for such `glm()` fits. (Spotted by Bill Dunlap.)
- `options(warn = 0)` failed to end a (C-level) context with more than 50 accumulated warnings. (Spotted by Jeffrey Horner.)
- The internal `plot.default()` code did not do sanity checks on a `cex` argument, so invalid input could cause problems. (Reported by Ben Bolker.)
- `anyDuplicated(<array>, MARGIN=0)` no longer fails. (Reported by Hervé Pagès.)

- `read.dcf()` removes trailing blanks: unfortunately on some platforms this included `\xa0` (non-breaking space) which is the trailing byte of a UTF-8 character. It now only considers ASCII space and tab to be 'blank'.
- There was a sign error in part of the calculations for the variance returned by `KalmanSmooth()`. (PR#14738)
- `pbinom(10, 1e6, 0.01, log.p = TRUE)` was `NaN` thanks to the buggy fix to PR#14320 in R 2.11.0. (PR#14739)
- `RweaveLatex()` now emulates auto-printing rather than printing, by calling `methods::show()` when auto-printing would.
- `duplicated()` ignored `fromLast` for a one-column data frame. (PR#14742)
- `source()` and related functions did not put the correct timestamp on the source references; `srcfilecopy()` has gained a new argument `timestamp` to support this fix. (PR#14750)
- `srcfilecopy()` has gained a new argument `isFile` and now records the working directory, to allow debuggers to find the original source file. (PR#14826)
- LaTeX conversion of Rd files did not correctly handle preformatted backslashes. (PR#14751)
- HTML conversion of Rd files did not handle markup within tabular cells properly. (PR#14708)
- `source()` on an empty file with `keep.source = TRUE` tried to read from `stdin()`, in R 2.14.0 only. (PR#14753)
- The code to check Rd files in packages would abort if duplicate description sections were present.

CHANGES IN R VERSION 2.14.0

SIGNIFICANT USER-VISIBLE CHANGES:

- All packages must have a namespace, and one is created on installation if not supplied in the sources. This means that any package without a namespace must be re-installed under this version of R (but previously-installed data-only packages without R code can still be used).
- The `yLineBias` of the `X11()` and `windows()` families of devices has been changed from 0.1 to 0.2: this changes slightly the vertical positioning of text in the margins (including axis annotations). This is mainly for consistency with other devices such as `quartz()` and `pdf()`. (Wish of PR#14538.)
  There is a new graphics parameter `"ylbias"` which allows the y-line bias of the graphics device to be tweaked, including to reproduce output from earlier versions of R.
- Labeling of the p-values in various anova tables has been rationalized to be either `"Pr(>F)"` or `"Pr(>Chi)"` (i.e., the `"Pr(F)"`, `"Pr(Chi)"` and `"P(>|Chi|)"` variants have been eliminated). Code which extracts the p value *via* indexing by name may need adjustment.
- `::` can now be used for datasets made available for lazy-loading in packages with namespaces (which makes it consistent with its use for data-only packages without namespaces in earlier versions of R).
- There is a new package **parallel**.
  It incorporates (slightly revised) copies of packages **multicore** and **snow** (excluding MPI, PVM and NWS clusters). Code written to use the higher-level API functions in those packages should work unchanged (apart from changing any references to their

namespaces to a reference to **parallel**, and links explicitly to **multicore** or **snow** on help pages).
It also contains support for multiple RNG streams following L'Ecuyer *et al* (2002), with support for both `mclapply` and **snow** clusters. This replaces functions like `clusterSetupRNG()` from **snow** (which are not in **parallel**).
The version released for R 2.14.0 contains base functionality: higher-level convenience functions are planned (and some are already available in the 'R-devel' version of R).

- Building PDF manuals (for R itself or packages, e.g. *via* `R CMD check`) by default requires the LaTeX package '`inconsolata`': see the section on 'Making the manuals' in the 'R Installation and Administration Manual'.
- `axTicks(*, log=TRUE)` has changed in some cases to satisfy the documented behavior and be consistent.

NEW FEATURES:

- `txtProgressBar()` can write to an open connection instead of the console.
- Non-portable package names ending in '`.`' are no longer allowed. Nor are single-character package names (**R** was already disallowed).
- `regexpr()` and `gregexpr()` with `perl = TRUE` allows Python-style named captures. (Wish and contribution of PR#14518.)
- The placement of 'plotmath' text in the margins of plots done by base graphics now makes the same vertical adjustment as ordinary text, so using ordinary and plotmath text on the same margin line will seem better aligned (but not exactly aligned, since ordinary text has descenders below the baseline and plotmath places them on the baseline). (Related to PR#14537.)
- `sunflowerplot()` now has a formula interface. (Wish of PR#14541.)
- `iconv()` has a new argument `toRaw` to handle encodings such as `UTF-16` with embedded nuls (as was possible before the `CHARSXP` cache was introduced).
It will also accept as input the type of list generated with `toRaw = TRUE`.
- Garbage-collecting an unused input text connection no longer gives a warning (since it 'connects' to nothing outside R).
- `read.table()` and `scan()` have gained a `text` argument, to allow reading data from a (possibly literal) character string.
- `optim(*, method = .)` now allows `method = "Brent"` as an interface to `optimize()`, for use in cases such as `mle()` where `optim()` is used internally.
- `mosaicplot()` gains a `border` argument. (Wish of PR#14550.)
- `smooth.spline()` gains a `tol` argument which controls how different `x` values need to be to be treated as distinct. The default has been changed to be more reliable for inputs whose range is small compared to their maximum absolute value. (Wish of PR#14452.)
- `gl()` runs faster by avoiding calling `factor()`.
- The `print()` method for `object.size()` accepts '`B`' as well as '`b`' as an abbreviation for 'bytes'.
- `unlink()` gains a `force` argument to work like `rm -f` and if possible override restrictive permissions.
- `pbirthday()` and `qbirthday()` now use exact calculations for `coincident = 2`.
- `unzip()` and `unz()` connections have been updated with support for more recent Zip64 features (including large file sizes and `bzip2` compression, but not UTF-8 file names).
`unzip()` has a new option to restore file times from those recorded (in an unknown timezone) in the zip file.

- `update.packages()` now accepts a character vector of package names for the `oldPkgs` argument. (Suggestion of Tal Galili.)
- The special reference class fields `.self` and `.refClassDef` are now read-only to prevent corrupting the object.
- `decompose()` now returns the original series as part of its value, so it can be used (rather than reconstructed) when plotting. (Suggestion of Rob Hyndman.)
- Rao's efficient score test has been implemented for `glm` objects. Specifically, the `add1`, `drop1`, and `anova` methods now allow `test = "Rao"`.
- If a saved workspace (e.g., '`.RData`') contains objects that cannot be loaded, R will now start with an warning message and an empty workspace, rather than failing to start.
- `strptime()` now accepts times such as '`24:00`' for midnight at the end of the day, for although these are disallowed by POSIX 1003.1-2008, ISO 8601:2004 allows them.
- Assignment of `names()` to S4 objects now checks for a corresponding `"names"` slot, and generates a warning or an error if that slot is not defined. See the section on slots in `?Classes`.
- The default methods for `is.finite()`, `is.infinite()` and `is.nan()` now signal an error if their argument is not an atomic vector.
- The formula method for `plot()` no longer places package **stats** on the search path (it loads the namespace instead).
- There now is a genuine `"function"` method for `plot()` rather than the generic dispatching internally to `graphics::plot.function()`. It is now exported, so can be called directly as `plot.function()`.
- The one-sided `ks.test()` allows `exact = TRUE` to be specified in the presence of ties (but the approximate calculation remains the default: the 'exact' computation makes assumptions known to be invalid in the presence of ties).
- The behaviour of `curve(add = FALSE)` has changed: it now no longer takes the default x limits from the previous plot (if any): rather they default to `c(0, 1)` just as the `"function"` method for `plot()`. To get the previous behaviour use `curve(add = NA)`, which also takes the default for log-scaling of the x-axis from the previous plot.
- Both `curve()` and the `plot()` method for functions have a new argument `xname` to facilitate plots such as `sin(t)` *vs* `t`.
- The `local` argument to `source()` can specify an environment as well as `TRUE` (`parent.env()`) and `FALSE` (`.GlobalEnv`). It gives better error messages for other values, such as `NA`.
- `vcov()` gains methods for classes `"summary.lm"` and `"summary.glm"`.
- The `plot()` method for class `"profile.nls"` gains `ylab` and `lty` arguments, and passes `...` on to `plot.default`.
- Character-string arguments such as the `mode` argument of `vector()`, `as.vector()` and `is.vector()` and the `description` argument of `file()` are required to be of length exactly one, rather than any further elements being silently discarded. This helps catch incorrect usage in programming.
- The `length` argument of `vector()` and its wrappers such as `numeric()` is required to be of length exactly one (other values are now an error rather than giving a warning as previously).
- `vector(len)` and `length(x) <- len` no longer accept `TRUE`/`FALSE` for `len` (not that they were ever documented to, but there was special-casing in the C code).
- There is a new function `Sys.setFileTime()` to set the time of a file (including a directory). See its help for exactly which times it sets on various OSes.

- The file times reported by `file.info()` are reported to sub-second resolution on systems which support it. (Currently the POSIX 2008 and FreeBSD/Darwin/NetBSD methods are detected.)
- New function `getCall(m)` as an abstraction for `m$call`, enabling `update()`'s default method to apply more universally. (NB: this can be masked by existing functions in packages.)
- `Sys.info()` gains a `euser` component to report the 'effective' user on OSes which have that concept.
- The result returned by `try()` now contains the original error condition object as the `"condition"` attribute.
- All packages with R code are lazy-loaded irrespective of the '`LazyLoad`' field in the '`DESCRIPTION`' file. A warning is given if the '`LazyLoad`' field is overridden.
- `Rd` markup has a new '`\figure`' tag so that figures can be included in help pages when converted to HTML or LaTeX. There are examples on the help pages for `par()` and `points()`.
- The built-in httpd server now allows access to files in the session temporary directory `tempdir()`, addressed as the '`/session`' directory on the httpd server.
- Development versions of R are no longer referred to by the number under which they might be released, e.g., in the startup banner, `R --version` and `sessionUtils()`. The correct way to refer to a development version of R is 'R-devel', preferably with the date and SVN version number.
  E.g., '`R-devel (2011-07-04 r56266)`'
- There is a new function `texi2pdf()` in package **tools**, currently a convenience wrapper for `texi2dvi(pdf = TRUE)`.
- There are two new options for typesetting PDF manuals from Rd files. These are '`beramono`' and '`inconsolata`', and used the named font for monospaced output. They are intended to be used in combination with '`times`', and '`times,inconsolata,hyper`' is now the default for the reference manual and package manuals. If you do not have that font installed, you can set `R_RD4PF` to one of the other options: see the 'R Installation and Administration Manual'.
- Automatic printing for reference classes is now done by the `$show()` method. A method is defined for class '`envRefClass`' and may be overridden for user classes (see the `?ReferenceClasses` example). S4 `show()` methods should no longer be needed for reference classes.
- `tools::Rdiff` (by default) and `R CMD Rdiff` now ignore differences in pointer values when comparing printed environments, compiled byte code, etc.
- The `"source"` attribute on functions created with `keep.source=TRUE` has been replaced with a `"srcref"` attribute. The `"srcref"` attribute references an in-memory copy of the source file using the `"srcfilecopy"` class or the new `"srcfilealias"` class.
  NB: This means that functions sourced with `keep.source = TRUE` and saved (e.g., by `save()` or `readRDS()`) in earlier versions of R will no longer show the original sources (including comments).
- New items '`User Manuals`' and Technical Papers have been added to the HTML help main page. These link to vignettes in the base and recommended packages and to a collection of papers about R issues, respectively.
- Documentation and messages have been standardized to use "namespace" rather than "name space".
- `setGeneric()` now looks in the default packages for a non-generic version of a function if called from a package with a namespace. (It always did for packages without a namespace.)

- Setting the environment variable `_R_WARN_ON_LOCKED_BINDINGS_` will give a warning if an attempt is made to change a locked binding.
- `\SweaveInput` is now supported when generating concordances in `Sweave()`.
- `findLineNum()` and `setBreakpoint()` now allow the environment to be specified indirectly; the latter gains a `clear` argument to allow it to call `untrace()`.
- The body of a closure can be one of further types of R objects, including environments and external pointers.
- The `Rd2HTML()` function in package **tools** now has a `stylesheet` argument, allowing pages to be displayed in alternate formats.
- New function `requireNamespace()` analogous to `require()`, returning a logical value after attempting to load a namespace.
- There is a new type of RNG, `"L'Ecuyer-CMRG"`, implementing L'Ecuyer (1999)'s 'combined multiple-recursive generator' '`MRG32k3a`'. See the comments on `?RNG`.
- `help.search()` and `??` can now display vignettes and demos as well as help pages. The new option `"help.search.types"` controls the types of documentation and the order of their display.
  This also applies to HTML searches, which now give results in all of help pages, vignettes and demos.
- `socketConnection()` now has a `timeout` argument. It is now documented that large values (package **snow** used a year) do not work on some OSes.
- The initialization of the random-number generator now uses the process ID as well as the current time, just in case two R processes are launched very rapidly on a machine with low-resolution wall clock (some have a resolution of a second; modern systems have microsecond-level resolution).
- New function `pskill()` in the **tools** package to send a terminate signal to one or more processes, plus constants such as `SIGTERM` to provide a portable way to refer to signals (since the numeric values are OS-dependent).
- New function `psnice()` in the **tools** package to return or change the 'niceness' of a process. (Refers to the 'priority class' on Windows.)
- `list.dirs()` gains a `recursive` argument.
- An '`Authors@R`' field in a package '`DESCRIPTION`' file can now be used to generate '`Author`' and '`Maintainer`' fields if needed, and to auto-generate package citations.
- New utility `getElement()` for accessing either a list component or a slot in an S4 object.
- `stars()` gains a `col.lines` argument, thanks to Dustin Sallings. (Wish of PR#14657.)
- New function `regmatches()` for extracting or replacing matched or non-matched substrings from match data obtained by `regexpr()`, `gregexpr()` and `regexec()`.
- `help(package = "pkg_name", help_type = "HTML")` now gives HTML help on the package rather than text help. (This gives direct access to the HTML version of the package manual shown *via* `help.start()`'s 'Packages' menu.)
- `agrep()` gains a `fixed` argument to optionally allow approximate regular expression matching, and a `costs` argument to specify possibly different integer match costs for insertions, deletions and substitutions.
- `read.dcf()` and `write.dcf()` gain a `keep.white` argument to indicate fields where whitespace should be kept as is.
- `available.packages()` now works around servers that fail to return an error code when '`PACKAGES.gz`' does not exist. (Patch submitted by Seth Schommer.)
- `readBin()` can now read more than $2^{31} - 1$ bytes in a single call (the previously documented limitation).

- New function `regexec()` for finding the positions of matches as well as all substrings corresponding to parenthesized subexpressions of the given regular expression.
- New function `adist()` in package **utils** for computing 'edit' (generalized Levenshtein) distances between strings.
- Class `"raster"` gains an `is.na` method to avoid confusion from the misuse of the matrix method (such as PR#14618).
- The `identical()` function gains an `ignore.bytecode` argument to control comparison of compiled functions.
- `pmin` and `pmax` now warn if an argument is partially recycled (wish of PR#14638).
- The default for `image(useRaster=)` is now taken from option `"preferRaster"`: for the small print see `?image`.
- `str()` now displays reference class objects and their fields, rather than treating them as classical S4 classes.
- New function `aregexec()` in package **utils** for finding the positions of approximate string matches as well as all substrings corresponding to parenthesized subexpressions of the given regular expression.
- `download.file()` has an `extra` argument to pass additional command-line options to the non-default methods using command-line utilities.
  `cacheOK = FALSE` is now supported for `method = "curl"`.
- `interaction.plot(*, type = .)` now also allows type `"o"` or `"c"`.
- `axTicks(*, log=TRUE)` did sometimes give more values than the ticks in the corresponding `graphics::axis()`. By default, it now makes use of the new (**graphics**-package independent) `axisTicks()` which can make use of a new utility `.axisPars()`. Further, it now returns a decreasing sequence (as for `log=FALSE`) when `usr` is decreasing.
- Using `fix()` or `edit()` on a R object (except perhaps a matrix or data frame) writes its temporary file with extension '`.R`' so editors which select their mode based on the extension will select a suitable mode.

GRAPHICS DEVICES:

- The `pdf()` device makes use of Flate compression: this is controlled by the new logical argument `compress`, and is enabled by default.
- Devices `svg()`, `cairo_pdf()` and `cairo_ps()` gain a `family` argument.
  On a Unix-alike `X11()` gains a `family` argument. This is one of the `x11.options()` and so can be passed as an argument to the `bmp()`, `jpeg()`, `png()` and `tiff()` devices. Analogous changes have been made on Windows, so all built-in R graphics devices now have a `family` argument except `pictex()` (which has no means to change fonts).
- The `bmp()`, `jpeg()`, `png()` and `tiff()` devices now make use of the `antialias` argument for `type = "quartz"`.
- There are several new built-in font mappings for `X11(type = "Xlib")`: see the help on `X11Fonts()`.
- There is a new type `X11(type = "dbcairo")` which updates the screen less frequently: see its help page.
- The `X11()` device now makes use of cursors to distinguish its states. The normal cursor is an arrow (rather than a crosshair); the crosshair is used when the locator is in use, and a watch cursor is shown when plotting computations are being done. (These are the standard names for X11 cursors: how they are actually displayed depends on the window manager.)
- New functions `dev.hold()` and `dev.flush()` for use with graphics devices with buffering. These are used for most of the high-level graphics functions such as `boxplot()`, so that the plot is only displayed when the page is complete.

Currently implemented for `windows(buffered = TRUE)`, `quartz()` and the cairographics-based `X11()` types with buffering (which are the default on-screen devices).

- New function `dev.capture()` for capture of bitmap snapshots of image-based devices (a superset of the functionality provided by `grid.cap()` in `grid`).
- The default `colormodel` for `pdf()` and `postscript()` is now called `"srgb"` to more accurately describe it. (Instead of `"rgb"`, and in the case of `postscript()` it no longer switches to and from the gray colorspace, by default.)
  The `colormodel` for `postscript()` which does use both gray and sRGB colorspaces is now called `"srgb+gray"`.
  Plots which are known to use only black/white/transparent can advantageously use `colormodel = "gray"` (just as before, but there is now slightly more advantage in doing so).
- `postscript()` with values `colormodel = "rgb"` and `colormodel = "rgb-nogray"` give the behaviour prior to R 2.13.0 of uncalibrated RGB, which under some circumstances can be rendered much faster by a viewer.
  `pdf(colormodel = "rgb")` gives the behaviour prior to R 2.13.0 of uncalibrated RGB, which under some circumstances can be rendered faster by a viewer, and the files will be smaller (by about 9KB if compression is not used).
- The `postscript()` device only includes the definition of the sRGB colorspace in the output file for the colormodels which use it.
- The `postscript()` and `pdf()` devices now output greyscale raster images (and not RGB) when `colormodel = "gray"`.
- `postscript(colormodel = "gray")` now accepts non-grey colours and uses their luminance (as `pdf()` long has).
- `colormodel = "grey"` is allowed as an alternative name for `postscript()` and `pdf()`.
- `pdf()` in the default sRGB colorspace outputs many fewer changes of colorspace, which may speed up rendering in some viewing applications.
- There is a new function `dev.capabilities()` to query the capabilities of the current device. The initial set of capabilities are support for semi-transparent colours, rendering and capturing raster images, the locator and for interactive events.
- For `pdf()`, `maxRasters` is increased as needed so the argument is no longer used.

SWEAVE & VIGNETTES:

- Options `keep.source = TRUE, figs.only = FALSE` are now the default.
- The way the type of user-defined options is determined has changed. Previously they were all regarded as logical: now the type is determined by the value given at first use.
- The allowed values of logical options are now precisely those allowed for character inputs to `as.logical()`: this means that '`t`' and '`f`' are no longer allowed (although `T` and `F` still are).
- The preferred location for vignette sources is now the directory '`vignettes`' and not '`inst/doc`': `R CMD build` will now re-build vignettes in directory '`vignettes`' and copy the '`.Rnw`' (etc) files and the corresponding PDFs to '`inst/doc`'. Further files to be copied to '`inst/doc`' can be specified *via* the file '`vignettes/.install_extras`'.
- `R CMD Sweave` now supports a '`--driver`' option to select the Sweave driver: the default is equivalent to '`--driver=RweaveLatex`'.
- `R CMD Sweave` and `R CMD Stangle` support options '`--encoding`' and '`--options`'.
- The `Rtangle()` driver allows `output = "stdout"` or `output = "stderr"` to select the output or message connection. This is convenient for scripting using something like

```
R CMD Stangle --options='output="stdout"' foo.Rnw > foo2.R
```

- There is a new option `pdf.compress` controlling whether PDF figures are generated using Flate compression (they are by default).
- `R CMD Sweave` now has a '`--pdf`' option to produce a PDF version of the processed Sweave document.
- It is no longer allowed to have two vignettes with the same vignette basename (e.g., '`vig.Rnw`' and '`vig.Snw`'). (Previously one vignette hid the other in the `vignette()` function.)

C-LEVEL FACILITIES:

- Function `R_tmpnam2` has been added to the API to allow a temporary filename to include a specified extension.

PACKAGE INSTALLATION:

- Package '`DESCRIPTION`' file field '`KeepSource`' forces the package to be installed with `keep.source = TRUE` (or `FALSE`). (Suggestion of Greg Snow. Note that as all packages are lazy-loaded, this is now only relevant at installation.)
  There are corresponding options '`--with-keep.source`' and '`--without-keep.source`' for `R CMD INSTALL`.
- `R CMD INSTALL` has a new option '`--byte-compile`' to byte-compile the packages during installation (since all packages are now lazy-loaded). This can be controlled on a per-package basis by the optional field '`ByteCompile`' in the '`DESCRIPTION`' file.
- A package R code but without a '`NAMESPACE`' file will have a default one created at `R CMD build` or `R CMD INSTALL` time, so all packages will be installed with namespaces. A consequence of this is that `.First.lib()` functions need to be copied to `.onLoad()` (usually) or `.onAttach()`. For the time being, if there is an auto-generated '`NAMESPACE`' file and no `.onLoad()` nor `.onAttach()` function is found but `.First.lib()` is, it will be run as the attach hook (unless the package is one of a list of known exceptions, when it will be run as the load hook).
- A warning is given if test-loading a package changes a locked binding in a package other than itself. It is likely that this will be disallowed in future releases. (There are *pro tem* some exceptions to the warning.)
- A dependency on SVN revision is allowed for `R`, e.g. `R (>= r56550)`. This should be used in conjunction with a version number, e.g. `R (>= 2.14.0), R (>= r56550)` to distinguish between R-patched and R-devel versions with the same SVN revision.
- `installed.packages()` now hashes the names of its cache files to avoid very rare problems with excessively long path names. (PR#14669)
- A top-level '`COPYING`' file in a package is no longer installed (file names '`LICENSE`' or '`LICENCE`' having long been preferred).

UTILITIES:

- `R CMD check` now gives an error if the R code in a vignette fails to run, unless this is caused by a missing package.
- `R CMD check` now unpacks tarballs in the same way as `R CMD INSTALL`, including making use of the environment variable `R_INSTALL_TAR` to override the default behaviour.
- `R CMD check` performs additional code analysis of package startup functions, and notifies about incorrect argument lists and (incorrect) calls to functions which modify the search path or inappropriately generate messages.
- `R CMD check` now also checks compiled code for symbols corresponding to functions which might terminate R or write to '`stdout`'/'`stderr`' instead of the console.

- `R CMD check` now uses a `pdf()` device when checking examples (rather than `postscript()`).
- `R CMD check` now checks line-endings of makefiles and C/C++/Fortran sources in subdirectories of '`src`' as well as in '`src`' itself.
- `R CMD check` now reports as a NOTE what look like methods documented with their full names even if there is a namespace and they are exported. In almost all cases they are intended to be used only as methods and should use the '`\method`' markup. In the other rare cases the recommended form is to use a function such as `coefHclust` which would not get confused with a method, document that and register it in the '`NAMESPACE`' file by `s3method(coef, hclust, coefHclust)`.
- The default for the environment variable `_R_CHECK_COMPACT_DATA2_` is now true: thus if using the newer forms of compression introduced in R 2.10.0 would be beneficial is now checked (by default).
- Reference output for a vignette can be supplied when checking a package by `R CMD check`: see 'Writing R Extensions'.
- `R CMD Rd2dvi` allows the use of LaTeX package '`inputenx`' rather than '`inputenc`': the value of the environment variable `RD2DVI_INPUTENC` is used. (LaTeX package '`inputenx`' is an optional install which provides greater coverage of the UTF-8 encoding.)
- `Rscript` on a Unix-alike now accepts file names containing spaces (provided these are escaped or quoted in the shell).
- `R CMD build` on a Unix-alike (only) now tries to preserve dates on files it copies from its input directory. (This was the undocumented behaviour prior to R 2.13.0.)

DEPRECATED AND DEFUNCT:

- `require()` no longer has a `save` argument.
- The `gamma` argument to `hsv()`, `rainbow()`, and `rgb2hsv()` has been removed.
- The '`--no-docs`' option for `R CMD build --binary` is defunct: use '`--install-args`' instead.
- The option '`--unsafe`' to `R CMD INSTALL` is defunct: use the identical option '`--no-lock`' instead.
- The entry point `pythag` formerly in '`Rmath.h`' is defunct: use instead the C99 function `hypot`.
- `R CMD build --binary` is formally defunct: `R CMD INSTALL --build` has long been the preferred alternative.
- `zip.file.extract()` is now defunct: use `unzip()` or `unz()` instead.
- `R CMD Rd2dvi` without the '`--pdf`' option is now deprecated: only PDF output will be supported in future releases (since this allows the use of fonts only supported for PDF), and only `R CMD Rd2pdf` will be available.
- Options such as '`--max-nsize`' and the function `mem.limits()` are now deprecated: these limits are nowadays almost never used, and are reported by `gc()` when they are in use.
- Forms like `binomial(link = "link")` for GLM families deprecated since R 2.4.0 are now defunct.
- The `declarativeOnly` argument to `loadNamespace()` (not relevant since R 2.13.0) has been removed.
- Use of `library.dynam()` without specifying all the first three arguments is deprecated. (It is often called from a namespace, and the defaults are only appropriate to a package.)

Use of `chname` in `library.dynam()` with the extension '`.so`' or `.dll` (which is clearly not allowed according to the help page) is deprecated. This also applies to `library.dynam.unload()` and `useDynLib` directives in '`NAMESPACE`' files.

- It is deprecated to use `mean(x)` and `sd(x)` directly on data frames (or also matrices, for `sd`) `x`, instead of simply using `sapply`.
  In the same spirit, `median(x)` now gives an error for a data frame `x` (it often gave nonsensical results).
- The `keep.source` argument to `library()` and `require()` is deprecated: it was only used for packages installed without lazy-loading, and now all packages are lazy-loaded.
- Using a false value for the '`DESCRIPTION`' field '`LazyLoad`' is deprecated.

INSTALLATION:

- The base and recommended packages are now byte-compiled (equivalent to `make bytecode` in R 2.13.x).
- Configure option '`--with-system-zlib`' now only makes use of the basic interface of `zlib` and not the C function '`gzseek`' which has shown erroneous behaviour in `zlib` 1.2.4 and 1.2.5.
- The `zlib` in the R sources is now version 1.2.5. (This is safe even on 32-bit Linux systems because only the basic interface is now used.)
- The '`.afm`' files in package **grDevices** are now installed as compressed files (as long done on Windows), saving ca 2MB on the installed size.
- The non-screen cairo-based devices are no longer in the X11 module and so can be installed without X11. (We have never seen a Unix-alike system with cairographics installed but not X11, but a user might select '`--without-x`'.)
- Configure will try to use '`-fobjc-exceptions`' for the Objective-C compiler (if present) to ensure that even compilers that do not enable exceptions by default (such as vanilla gcc) can be used. (Objective-C is currently only used on Mac OS X.)
- The system call `times` is required.
- The C99 functions `acosh`, `asinh`, `atanh`, `snprintf` and `vsnprintf` are now required.
- There is no longer support for making DVI manuals *via* `make dvi`, `make install-dvi` and similar. Only PDF manuals are supported (to allow the use of fonts which are only available for PDF.)
- The '`configure`' arguments used during configuration of R are included as a comment in '`Makeconf`' for informative purposes on Unix-alikes in a form suitable for shell execution. Note that those are merely command-line arguments, they do not include environment variables (one more reason to use configure variables instead) or site configuration settings.
- Framework installation now supports `DESTDIR` (Mac OS X only).
- Java detection (`R CMD javareconf`) works around bogus `java.library.path` property in recent Oracle Java binaries.

BUG FIXES:

- The locale category '`LC_MONETARY`' was only being set on startup on Windows: that is now done on Unix-alikes where supported.
- Reference class utilities will detect an attempt to modify methods or fields in a locked class definition (e.g., in a namespace) and generate an error.
- The formula methods for `lines()`, `points()` and `text()` now work even if package **stats** is not on the search path.

- In principle, S4 classes from different packages could have the same name. This has not previously worked. Changes have now been installed that should allow such classes and permit methods to use them. New functions `className()` and `multipleClasses()` are related tools for programming.
- Work around an issue in Linux (a system `select` call resetting `tv`) which prevented internet operations from timing out properly.
- Several stack trampling and overflow issues have been fixed in TRE, triggered by `agrep` and friends with long patterns. (PR#14627)
- ("design infelicity") Field assignments in reference classes are now consistent with slots in S4 classes: the assigned value must come from the declared class (if any) for the field or from a subclass.
- The methods objects constructed for `"coerce"` and `"coerce<-"` were lacking some essential information in the `generic`, `defined` and `target` slots; `as()` did not handle duplicate class definitions correctly.
- The parser no longer accepts the digit `8` in an octal character code in a string, nor does it accept unterminated strings in a file. (Reported by Bill Dunlap.)
- The `print()` method for class `"summary.aov"` did not pass on argument `digits` when `summary()` was called on a single object, and hence used more digits than documented.
- The `X11()` device's cairo back-end produced incorrect capture snapshot images on big-endian machines.
- `loglin()` gave a spurious error when argument `margin` consisted of a single element of length one. (PR#14690)
- `loess()` is better protected against misuse, e.g. zero-length `span`. (PR#14691)
- `HoltWinters()` checks that the optimization succeeded. (PR#14694)
- The (undocumented) inclusion of superclass objects in default initializing of reference classes overwrote explicit field arguments. The bug is fixed, the feature documented and a test added.
- `round(x, -Inf)` now does something sensible (return zero rather than `NA`).
- `signif(x, -Inf)` now behaves as documented (`signif(x, 1)`) rather than giving zero.
- The `"table"` method for `Axis()` hardcoded `side = 1`, hence calls to `plot(<vector>, <table>)` labelled the wrong axis. (PR#14699)
- Creating a connection might fail under `gctorture(TRUE)`.
- `stack()` and `unstack()` converted character columns to factors.
  `unstack()` sometimes produced incorrect results (a list or a vector) if the factor on which to un-split had only one level.
- On some systems `help(".C", help_type = "pdf")` and similar generated file names that TeX was unable to handle.
- Non-blocking listening socket connections continued to report `isIncomplete()` as true even when the peer had closed down and all available input had been read.
- The revised HTML search system now generates better hyperlinks to help topics found: previously it gave problems with help pages with names containing e.g. spaces and slashes.
- A late change in R 2.13.2 broke '`\Sexpr`' expressions in Rd files.
- The creation of ticks on log axes (including by `axTicks()`) sometimes incorrectly omitted a tick at one end of the range by rounding error in a platform-dependent way. This could be seen in the examples for `axTicks()`, where with axis limits `c(0.2, 88)` the tick for `0.2` was sometimes omitted.

- `qgamma()` for small `shape` underflows to `0` rather than sometimes giving `NaN`. (PR#8528, PR#14710)
- `mapply()` now gives an explicit error message (rather than an obscure one) if inputs of zero and positive length are mixed.
- Setting a Hershey font family followed by string height query would crash R.
- `R CMD javareconf -e` would fail for some shells due to a shift error. Also the resulting paths will no longer contain `$(JAVA_HOME)` as that can result in an unintended substitution based on '`Makeconf`' instead of the shell setting.

CHANGES IN R VERSION 2.13.2

NEW FEATURES:

- `mem.limits()` now reports values larger than the maximum integer (previously documented to be reported as `NA`), and allows larger values to be set, including `Inf` to remove the limit.
- The `print()` methods for classes `"Date"`, `"POSIXct"` and `"POSIXlt"` respect the option `"max.print"` and so are much faster for very long datetime vectors. (Suggestion of Yohan Chalabi.)
- `untar2()` now works around errors generated with `tar` files that use more than the standard 6 digits for the checksum. (PR#14654)
- `install.packages()` with `Ncpus > 1` guards against simultaneous installation of indirect dependencies as well as direct ones.
- Sweave now knows about a few more Windows' encodings (including `cp1250` and `cp1257`) and some `inputenx` encodings such as `koi8-r`.
- `postscript(colormodel = "rgb-nogray")` no longer sets the sRGB colorspace for each colour and so some viewers may render its files much faster than the default `colormodel ="rgb"`.
- The default for `pdf(maxRasters=)` has been increased from 64 to 1000.
- `readBin()` now warns if `signed = FALSE` is used inappropriately (rather than being silently ignored).
  It enforces the documented limit of $2^{31} - 1$ bytes in a single call.
- PCRE has been updated to version 8.13, a bug-fix release with updated Unicode tables (version 6.0.0). An additional patch (r611 from PCRE 8.20-to-be) has been added to fix a collation symbol recognition issue.

INSTALLATION:

- It is possible to build in '`src/extra/xdr`' on more platforms. (Needed since glibc 2.14 hides its RPC implementation.)
- `configure` will find the Sun TI-RPC implementation of xdr (in '`libtirpc`') provided its header files are in the search path: see the 'R Installation and Administration Manual'.

PACKAGE INSTALLATION:

- Using a broad `exportPattern` directive in a '`NAMESPACE`' file is no longer allowed to export internal objects such as `.onLoad` and `.__S3MethodsTable__.` .
  These are also excluded from imports, along with `.First.lib`.

BUG FIXES:

- `fisher.test()` had a buglet: If arguments were factors with unused levels, levels were dropped and you would get an error saying that there should be at least two levels, inconsistently with pre-tabulated data. (Reported by Michael Fay).
- `package.skeleton()` will no longer dump S4 objects supplied directly rather than in a code file. These cannot be restored correctly from the dumped version.
- Build-time expressions in help files did not have access to functions in the package being built (with `R CMD build`).
- Because `quote()` did not mark its result as being in use, modification of the result could in some circumstances modify the original call.
- Plotting `pch = '.'` now guarantees at least a one-pixel dot if `cex > 0`.
- The very-rarely-used command-line option '`--max-vsize`' was incorrectly interpreted as a number of Vcells and not in bytes as documented. (Spotted by Christophe Rhodes.)
- The HTML generated by `Rd2HTML()` comes closer to being standards compliant.
- `filter(x, recursive = TRUE)` gave incorrect results on a series containing `NA`s. (Spotted by Bill Dunlap.)
- Profiling `stats::mle()` fits with a `fixed` parameter was not supported. (PR#14646)
- `retracemem()` was still using positional matching. (PR#14650)
- The `quantile` method for `"ecdf"` objects now works and is documented.
- `xtabs(~ .., ..., sparse=TRUE)` now also works together with an `exclude = ..` specification.
- `decompose()` computed an incorrect seasonal component for time series with odd frequencies.
- The `pdf()` device only includes the definition of the sRGB colorspace in the output file for the `"rgb"` colormodel (and not for `"gray"` nor `"cmyk"`): this saves ca 9KB in the output file.
- `.hasSlot()` wrongly gave `FALSE` in some cases.
- `Sweave()` with `keep.source=TRUE` could generate spurious `NA` lines when a chunk reference appeared last in a code chunk.
- '`\Sexpr[results=rd]`' in an '`.Rd`' file now first tries `parse_Rd(fragment=FALSE)` to allow Rd section-level macros to be inserted.
- The `print()` method for class `"summary.aov"` did not pass on arguments such as `signif.stars` when `summary()` was called on a single object. (PR#14684)
- In rare cases `ks.test()` could return a p-value very slightly less than 0 by rounding error. (PR#14671)
- If `trunc()` was called on a `"POSIXlt"` vector and the result was subsetted, all but the first element was converted to `NA`. (PR#14679)
- `cbind()` and `rbind()` could cause memory corruption when used on a combination of raw and logical/integer vectors.

CHANGES IN R VERSION 2.13.1

NEW FEATURES:

- `iconv()` no longer translates `NA` strings as `"NA"`.
- `persp(box = TRUE)` now warns if the surface extends outside the box (since occlusion for the box and axes is computed assuming the box is a bounding box). (PR#202)
- `RShowDoc()` can now display the licences shipped with R, e.g. `RShowDoc("GPL-3")`.

- New wrapper function `showNonASCIIfile()` in package **tools**.
- `nobs()` now has a `"mle"` method in package **stats4**.
- `trace()` now deals correctly with S4 reference classes and corresponding reference methods (e.g., `$trace()`) have been added.
- `xz` has been updated to 5.0.3 (very minor bugfix release).
- `tools::compactPDF()` gets more compression (usually a little, sometimes a lot) by using the compressed object streams of PDF 1.5.
- `cairo_ps(onefile = TRUE)` generates encapsulated EPS on platforms with cairo >= 1.6.
- Binary reads (e.g., by `readChar()` and `readBin()`) are now supported on clipboard connections. (Wish of PR#14593.)
- `as.POSIXlt.factor()` now passes `...` to the character method (suggestion of Joshua Ulrich). [Intended for R 2.13.0 but accidentally removed before release.]
- `vector()` and its wrappers such as `integer()` and `double()` now warn if called with a `length` argument of more than one element. This helps track down user errors such as calling `double(x)` instead of `as.double(x)`.

INSTALLATION:

- Building the vignette PDFs in packages **grid** and **utils** is now part of running `make` from an SVN checkout on a Unix-alike: a separate `make vignettes` step is no longer required.
  These vignettes are now made with `keep.source = TRUE` and hence will be laid out differently.
- `make install-strip` failed under some configuration options.
- Packages can customize non-standard installation of compiled code via a `src/install.libs.R` script. This allows packages that have architecture-specific binaries (beyond the package's shared objects/DLLs) to be installed in a multi-architecture setting.

SWEAVE & VIGNETTES:

- `Sweave()` and `Stangle()` gain an `encoding` argument to specify the encoding of the vignette sources if the latter do not contain a '`\usepackage[]{inputenc}`' statement specifying a single input encoding.
- There is a new Sweave option `figs.only = TRUE` to run each figure chunk only for each selected graphics device, and not first using the default graphics device. This will become the default in R 2.14.0.
- Sweave custom graphics devices can have a custom function `foo.off()` to shut them down.
- Warnings are issued when non-portable filenames are found for graphics files (and chunks if `split = TRUE`). Portable names are regarded as alphanumeric plus hyphen, underscore, plus and hash (periods cause problems with recognizing file extensions).
- The `Rtangle()` driver has a new option `show.line.nos` which is by default false; if true it annotates code chunks with a comment giving the line number of the first line in the sources (the behaviour of R >= 2.12.0).
- Package installation tangles the vignette sources: this step now converts the vignette sources from the vignette/package encoding to the current encoding, and records the encoding (if not ASCII) in a comment line at the top of the installed '`.R`' file.

LICENCE:

- No parts of R are now licensed solely under GPL-2. The licences for packages **rpart** and **survival** have been changed, which means that the licence terms for R as distributed are GPL-2 | GPL-3.

DEPRECATED AND DEFUNCT:

- The internal functions `.readRDS()` and `.saveRDS()` are now deprecated in favour of the public functions `readRDS()` and `saveRDS()` introduced in R 2.13.0.
- Switching off lazy-loading of code *via* the '`LazyLoad`' field of the '`DESCRIPTION`' file is now deprecated. In future all packages will be lazy-loaded.
- The off-line `help()` types '`"postscript"`' and '`"ps"`' are deprecated.

UTILITIES:

- `R CMD check` on a multi-architecture installation now skips the user's '`.Renviron`' file for the architecture-specific tests (which do read the architecture-specific '`Renviron.site`' files). This is consistent with single-architecture checks, which use '`--no-environ`'.
- `R CMD build` now looks for '`DESCRIPTION`' fields '`BuildResaveData`' and '`BuildKeepEmpty`' for per-package overrides. See 'Writing R Extensions'.

BUG FIXES:

- `plot.lm(which = 5)` was intended to order factor levels in increasing order of mean standardized residual. It ordered the factor labels correctly, but could plot the wrong group of residuals against the label. (PR#14545)
- `mosaicplot()` could clip the factor labels, and could overlap them with the cells if a non-default value of `cex.axis` was used. (Related to PR#14550.)
- `dataframe[[row,col]]` now dispatches on `[[` methods for the selected column. (Spotted by Bill Dunlap).
- `sort.int()` would strip the class of an object, but leave its object bit set. (Reported by Bill Dunlap.)
- `pbirthday()` and `qbirthday()` did not implement the algorithm exactly as given in their reference and so were unnecessarily inaccurate.
  `pbirthday()` now solves the approximate formula analytically rather than using `uniroot()` on a discontinuous function.
  The description of the problem was inaccurate: the probability is a tail probability ('2 *or more* people share a birthday')
- Complex arithmetic sometimes warned incorrectly about producing NAs when there were NaNs in the input.
- `seek(origin = "current")` incorrectly reported it was not implemented for a `gzfile()` connection.
- `c()`, `unlist()`, `cbind()` and `rbind()` could silently overflow the maximum vector length and cause a segfault. (PR#14571)
- The `fonts` argument to `X11(type = "Xlib")` was being ignored.
- Reading (e.g., with `readBin()`) from a raw connection was not advancing the pointer, so successive reads would read the same value. (Spotted by Bill Dunlap.)
- Parsed text containing embedded newlines was printed incorrectly by `as.character.srcref()`. (Reported by Hadley Wickham.)
- `decompose()` used with a series of a non-integer number of periods returned a seasonal component shorter than the original series. (Reported by Rob Hyndman.)
- `fields = list()` failed for `setRefClass()`. (Reported by Michael Lawrence.)

- Reference classes could not redefine an inherited field which had class `"ANY"`. (Reported by Janko Thyson.)
- Methods that override previously loaded versions will now be installed and called. (Reported by Iago Mosqueira.)
- `addmargins()` called `numeric(apos)` rather than `numeric(length(apos))`.
- The HTML help search sometimes produced bad links. (PR#14608)
- Command completion will no longer be broken if `tail.default()` is redefined by the user. (Problem reported by Henrik Bengtsson.)
- LaTeX rendering of markup in titles of help pages has been improved; in particular, `\eqn{}` may be used there.
- `isClass()` used its own namespace as the default of the `where` argument inadvertently.
- Rd conversion to latex mishandled multi-line titles (including cases where there was a blank line in the '`\title`' section). (It seems this happened only in 2.13.0 patched.)
- `postscript()` with an sRGB colormodel now uses sRGB for raster images (in R 2.13.[01] it used uncalibrated RGB).
  There is no longer an undocumented 21845-pixel limit on raster images.

CHANGES IN R VERSION 2.13.0

SIGNIFICANT USER-VISIBLE CHANGES:

- `replicate()` (by default) and `vapply()` (always) now return a higher-dimensional array instead of a matrix in the case where the inner function value is an array of dimension >= 2.
- Printing and formatting of floating point numbers is now using the correct number of digits, where it previously rarely differed by a few digits. (See "scientific" entry below.) This affects *many* '`*.Rout.save`' checks in packages.

NEW FEATURES:

- `normalizePath()` has been moved to the **base** package (from **utils**): this is so it can be used by `library()` and friends.
  It now does tilde expansion.
  It gains new arguments `winslash` (to select the separator on Windows) and `mustWork` to control the action if a canonical path cannot be found.
- The previously barely documented limit of 256 bytes on a symbol name has been raised to 10,000 bytes (a sanity check). Long symbol names can sometimes occur when deparsing expressions (for example, in `model.frame`).
- `reformulate()` gains a `intercept` argument.
- `cmdscale(add = FALSE)` now uses the more common definition that there is a representation in `n-1` or less dimensions, and only dimensions corresponding to positive eigenvalues are used. (Avoids confusion such as PR#14397.)
- Names used by `c()`, `unlist()`, `cbind()` and `rbind()` are marked with an encoding when this can be ascertained.
- R colours are now defined to refer to the sRGB color space.
  The PDF, PostScript, and Quartz graphics devices record this fact. X11 (and cairo) and Windows just assume that your screen conforms.
- `system.file()` gains a `mustWork` argument (suggestion of Bill Dunlap).
- `new.env(hash = TRUE)` is now the default.

- `list2env(envir = NULL)` defaults to hashing (with a suitably sized environment) for lists of more than 100 elements.
- `text()` gains a formula method.
- `IQR()` now has a `type` argument which is passed to `quantile()`.
- `as.vector()`, `as.double()` etc duplicate less when they leave the mode unchanged but remove attributes.
  `as.vector(mode = "any")` no longer duplicates when it does not remove attributes. This helps memory usage in `matrix()` and `array()`.
  `matrix()` duplicates less if `data` is an atomic vector with attributes such as names (but no class).
  `dim(x) <- NULL` duplicates less if `x` has neither dimensions nor names (since this operation removes names and dimnames).
- `setRepositories()` gains an `addURLs` argument.
- `chisq.test()` now also returns a `stdres` component, for standardized residuals (which have unit variance, unlike the Pearson residuals).
- `write.table()` and friends gain a `fileEncoding` argument, to simplify writing files for use on other OSes (e.g., a spreadsheet intended for Windows or Mac OS X Excel).
- Assignment expressions of the form `foo::bar(x) <- y` and `foo:::bar(x) <- y` now work; the replacement functions used are `foo::`bar<-`` and `foo:::`bar<-``.
- `Sys.getenv()` gains a `names` argument so `Sys.getenv(x, names = FALSE)` can replace the common idiom of `as.vector(Sys.getenv())`. The default has been changed to not name a length-one result.
- Lazy loading of environments now preserves attributes and locked status. (The locked status of bindings and active bindings are still not preserved; this may be addressed in the future).
- `options("install.lock")` may be set to `FALSE` so that `install.packages()` defaults to '`--no-lock`' installs, or (on Windows) to `TRUE` so that binary installs implement locking.
- `sort(partial = p)` for large `p` now tries Shellsort if quicksort is not appropriate and so works for non-numeric atomic vectors.
- `sapply()` gets a new option `simplify = "array"` which returns a "higher rank" array instead of just a matrix when `FUN()` returns a `dim()` length of two or more.
  `replicate()` has this option set by default, and `vapply()` now behaves that way internally.
- `aperm()` becomes S3 generic and gets a `table` method which preserves the class.
- `merge()` and `as.hclust()` methods for objects of class `"dendrogram"` are now provided.
- The character method of `as.POSIXlt()` now tries to find a format that works for all non-`NA` inputs, not just the first one.
- `str()` now has a method for class `"Date"` analogous to that for class `"POSIXt"`.
- New function `file.link()` to create hard links on those file systems (POSIX, NTFS but not FAT) that support them.
- New `Summary()` group method for class `"ordered"` implements `min()`, `max()` and `range()` for ordered factors.
- `mostattributes<-()` now consults the `"dim"` attribute and not the `dim()` function, making it more useful for objects (such as data frames) from classes with methods for `dim()`. It also uses `attr<-()` in preference to the generics `name<-()`, `dim<-()` and `dimnames<-()`. (Related to PR#14469.)
- There is a new option `"browserNLdisabled"` to disable the use of an empty (e.g., via the 'Return' key) as a synonym for `c` in `browser()` or `n` under `debug()`. (Wish of PR#14472.)

- `example()` gains optional new arguments `character.only` and `give.lines` enabling programmatic exploration.
- `serialize()` and `unserialize()` are no longer described as 'experimental'. The interface is now regarded as stable, although the serialization format may well change in future releases. (`serialize()` has a new argument `version` which would allow the current format to be written if that happens.)
  New functions `saveRDS()` and `readRDS()` are public versions of the 'internal' functions `.saveRDS()` and `.readRDS()` made available for general use. The dot-name versions remain available as several package authors have made use of them, despite the documentation. `readRDS()` no longer wraps non-file connections in a call to `gzcon()`, for efficiency (see its documentation).
  `saveRDS()` supports `compress = "xz"`.
- Many functions when called with a not-open connection will now ensure that the connection is left not-open in the event of error. These include `read.dcf()`, `dput()`, `dump()`, `load()`, `parse()`, `readBin()`, `readChar()`, `readLines()`, `save()`, `writeBin()`, `writeChar()`, `writeLines()`, `.readRDS()`, `.saveRDS()` and `tools::parse_Rd()`, as well as functions calling these.
- Public functions `find.package()` and `path.package()` replace the internal dot-name versions.
- The default method for `terms()` now looks for a `"terms"` attribute if it does not find a `"terms"` component, and so works for model frames.
- `httpd()` handlers receive an additional argument containing the full request headers as a raw vector (this can be used to parse cookies, multi-part forms etc.). The recommended full signature for handlers is therefore `function(url,query, body, headers, ...)`.
- `file.edit()` gains a `fileEncoding` argument to specify the encoding of the file(s).
- The format of the HTML package listings has changed. If there is more than one library tree , a table of links to libraries is provided at the top and bottom of the page. Where a library contains more than 100 packages, an alphabetic index is given at the top of the section for that library. (As a consequence, package names are now sorted case-insensitively whatever the locale.)
- `isSeekable()` now returns `FALSE` on connections which have non-default `encoding`. Although documented to record if 'in principle' the connection supports seeking, it seems safer to report `FALSE` when it may not work.
- `R CMD REMOVE` and `remove.packages()` now remove file `R.css` when removing all remaining packages in a library tree. (Related to the wish of PR#14475: note that this file is no longer installed.)
- `unzip()` now has a `unzip` argument like `zip.file.extract()`. This allows an external `unzip` program to be used, which can be useful to access features supported by Info-ZIP's `unzip` version 6 which is now becoming more widely available.
- There is a simple `zip()` function, as wrapper for an external `zip` command.
- `bzfile()` connections can now read from concatenated `bzip2` files (including files written with `bzfile(open = "a")`) and files created by some other compressors (such as the example of PR#14479).
- The primitive function `c()` is now of type BUILTIN.
- `plot(<dendrogram>, .., nodePar=*)` now obeys an optional `xpd` specification (allowing clipping to be turned off completely).
- `nls(algorithm="port")` now shares more code with `nlminb()`, and is more consistent with the other `nls()` algorithms in its return value.
- `xz` has been updated to 5.0.1 (very minor bugfix release).

- `image()` has gained a logical `useRaster` argument allowing it to use a bitmap raster for plotting a regular grid instead of polygons. This can be more efficient, but may not be supported by all devices. The default is `FALSE`.
- `list.files()`/`dir()` gains a new argument `include.dirs()` to include directories in the listing when `recursive = TRUE`.
- New function `list.dirs()` lists all directories, (even empty ones).
- `file.copy()` now (by default) copies read/write/execute permissions on files, moderated by the current setting of `Sys.umask()`.
- `Sys.umask()` now accepts `mode = NA` and returns the current `umask` value (visibly) without changing it.
- There is a `!` method for classes `"octmode"` and `"hexmode"`: this allows `xor(a, b)` to work if both `a` and `b` are from one of those classes.
- `as.raster()` no longer fails for vectors or matrices containing `NA`s.
- New hook `"before.new.plot"` allows functions to be run just before advancing the frame in `plot.new`, which is potentially useful for custom figure layout implementations.
- Package **tools** has a new function `compactPDF()` to try to reduce the size of PDF files *via* `qpdf` or `gs`.
- `tar()` has a new argument `extra_flags`.
- `dotchart()` accepts more general objects `x` such as 1D tables which can be coerced by `as.numeric()` to a numeric vector, with a warning since that might not be appropriate.
- The previously internal function `create.post()` is now exported from **utils**, and the documentation for `bug.report()` and `help.request()` now refer to that for `create.post()`.
  It has a new `method = "mailto"` on Unix-alikes similar to that on Windows: it invokes a default mailer via `open` (Mac OS X) or `xdg-open` or the default browser (elsewhere). The default for `ccaddress` is now `getOption("ccaddress")` which is by default unset: using the username as a mailing address nowadays rarely works as expected.
- The default for `options("mailer")` is now `"mailto"` on all platforms.
- `unlink()` now does tilde-expansion (like most other file functions).
- `file.rename()` now allows vector arguments (of the same length).
- The `"glm"` method for `logLik()` now returns an `"nobs"` attribute (which `stats4::BIC()` assumed it did).
  The `"nls"` method for `logLik()` gave incorrect results for zero weights.
- There is a new generic function `nobs()` in package **stats**, to extract from model objects a suitable value for use in BIC calculations. An S4 generic derived from it is defined in package **stats4**.
- Code for S4 reference-class methods is now examined for possible errors in non-local assignments.
- `findClasses`, `getGeneric`, `findMethods` and `hasMethods` are revised to deal consistently with the `package=` argument and be consistent with soft namespace policy for finding objects.
- `tools::Rdiff()` now has the option to return not only the status but a character vector of observed differences (which are still by default sent to '`stdout`').
- The startup environment variables `R_ENVIRON_USER`, `R_ENVIRON`, `R_PROFILE_USER` and `R_PROFILE` are now treated more consistently. In all cases an empty value is considered to be set and will stop the default being used, and for the last two tilde expansion is performed on the file name. (Note that setting an empty value is probably impossible on Windows.)

- Using `R --no-environ CMD`, `R --no-site-file CMD` or `R --no-init-file CMD` sets environment variables so these settings are passed on to child R processes, notably those run by `INSTALL`, `check` and `build`. `R --vanilla CMD` sets these three options (but not '`--no-restore`').
- `smooth.spline()` is somewhat faster. With `cv=NA` it allows some leverage computations to be skipped,
- The internal (C) function '`scientific()`', at the heart of R's `format.info(x)`, `format(x)`, `print(x)`, etc, for numeric `x`, has been re-written in order to provide slightly more correct results, fixing PR#14491, notably in border cases including when `digits >= 16`, thanks to substantial contributions (code and experiments) from Petr Savicky. This affects a noticeable amount of numeric output from R.
- A new function `grepRaw()` has been introduced for finding subsets of raw vectors. It supports both literal searches and regular expressions.
- Package **compiler** is now provided as a standard package. See `?compiler::compile` for information on how to use the compiler. This package implements a byte code compiler for R: by default the compiler is not used in this release. See the 'R Installation and Administration Manual' for how to compile the base and recommended packages.
- Providing an `exportPattern` directive in a NAMESPACE file now causes classes to be exported according to the same pattern, for example the default from `package.skeleton()` to specify all names starting with a letter. An explicit directive to `exportClassPattern` will still over-ride.
- There is an additional marked encoding `"bytes"` for character strings. This is intended to be used for non-ASCII strings which should be treated as a set of bytes, and never re-encoded as if they were in the encoding of the current locale: `useBytes = TRUE` is automatically selected in functions such as `writeBin()`, `writeLines()`, `grep()` and `strsplit()`.
  Only a few character operations are supported (such as `substr()`).
  Printing, `format()` and `cat()` will represent non-ASCII bytes in such strings by a '`\xab`' escape.
- The new function `removeSource()` removes the internally stored source from a function.
- `"srcref"` attributes now include two additional line number values, recording the line numbers in the order they were parsed.
- New functions have been added for source reference access: `getSrcFilename()`, `getSrcDirectory()`, `getSrcLocation()` and `getSrcref()`.
- `Sys.chmod()` has an extra argument `use_umask` which defaults to true and restricts the file mode by the current setting of `umask`. This means that all the R functions which manipulate file/directory permissions by default respect `umask`, notably `R CMD INSTALL`.
- `tempfile()` has an extra argument `fileext` to create a temporary filename with a specified extension. (Suggestion and initial implementation by Dirk Eddelbuettel.)
  There are improvements in the way `Sweave()` and `Stangle()` handle non-ASCII vignette sources, especially in a UTF-8 locale: see 'Writing R Extensions' which now has a subsection on this topic.
- `factanal()` now returns the rotation matrix if a rotation such as `"promax"` is used, and hence factor correlations are displayed. (Wish of PR#12754.)
- The `gctorture2()` function provides a more refined interface to the GC torture process. Environment variables `R_GCTORTURE`, `R_GCTORTURE_WAIT`, and `R_GCTORTURE_INHIBIT_RELEASE` can also be used to control the GC torture process.

- `file.copy(from, to)` no longer regards it as an error to supply a zero-length `from`: it now simply does nothing.
- `rstandard.glm()` gains a `type` argument which can be used to request standardized Pearson residuals.
- A start on a Turkish translation, thanks to Murat Alkan.
- `.libPaths()` calls `normalizePath(winslash = "/")` on the paths: this helps (usually) to present them in a user-friendly form and should detect duplicate paths accessed via different symbolic links.
- `download.file()` can be now used with external methods even if there are spaces in the URL or the target filename.
- The first formal argument of `.C()`, `.Fortran()`, `.Call()` and `.External()` is now referred to a `.NAME` rather than `name`: however actual calls should have an unnamed first argument.

SWEAVE CHANGES:

- `Sweave()` has options to produce PNG and JPEG figures, and to use a custom function to open a graphics device (see `?RweaveLatex`).
  (Based in part on the contribution of PR#14418.)
- The default for `Sweave()` is to produce only PDF figures (rather than both EPS and PDF).
- Environment variable `SWEAVE_OPTIONS` can be used to supply defaults for existing or new options to be applied after the Sweave driver setup has been run.
- The Sweave manual is now included as a vignette in the **utils** package.
- `Sweave()` handles `keep.source=TRUE` much better: it could duplicate some lines and omit comments. (Reported by John Maindonald and others.)

C-LEVEL FACILITIES:

- Because they use a C99 interface which a C++ compiler is not required to support, `Rvprintf` and `REvprintf` are only defined by '`R_ext/Print.h`' in C++ code if the macro `R_USE_C99_IN_CXX` is defined when it is included.
- `pythag` duplicated the C99 function `hypot`. It is no longer provided, but is used as a substitute for `hypot` in the very unlikely event that the latter is not available.
- `R_inspect(obj)` and `R_inspect3(obj, deep, pvec)` are (hidden) C-level entry points to the internal `inspect` function and can be used for C-level debugging (e.g., in conjunction with the `p` command in `gdb`).
- Compiling R with '`--enable-strict-barrier`' now also enables additional checking for use of unprotected objects. In combination with `gctorture()` or `gctorture2()` and a C-level debugger this can be useful for tracking down memory protection issues.

UTILITIES:

- `R CMD Rdiff` is now implemented in R on Unix-alikes (as it has been on Windows since R 2.12.0).
- `R CMD build` no longer does any cleaning in the supplied package directory: all the cleaning is done in the copy.
  It has a new option '`--install-args`' to pass arguments to `R CMD INSTALL` for '`--build`' (but not when installing to rebuild vignettes).
  There is new option, '`--resave-data`', to call `tools::resaveRdaFiles()` on the '`data`' directory, to compress tabular files ('`.tab`', '`.csv`' etc) and to convert '`.R`' files to '`.rda`' files. The default, '`--resave-data=gzip`', is to do so in a way compatible even with years-old versions of R, but better compression is given by '`--resave-data=best`', requiring R >= 2.10.0.

It now adds a 'datalist' file for 'data' directories of more than 1Mb.
Patterns in '.Rbuildignore' are now also matched against all directory names (including those of empty directories).
There is a new option, '--compact-vignettes', to try reducing the size of PDF files in the 'inst/doc' directory. Currently this tries qpdf: other options may be used in future.
When re-building vignettes and a 'inst/doc/Makefile' file is found, make clean is run if the makefile has a clean: target.
After re-building vignettes the default clean-up operation will remove any directories (and not just files) created during the process: e.g., one package created a '.R_cache' directory.
Empty directories are now removed unless the option '--keep-empty-dirs' is given (and a few packages do deliberately include empty directories).
If there is a field BuildVignettes in the package 'DESCRIPTION' file with a false value, re-building the vignettes is skipped.

- R CMD check now also checks for filenames that are case-insensitive matches to Windows' reserved file names with extensions, such as 'nul.Rd', as these have caused problems on some Windows systems.
  It checks for inefficiently saved 'data/*.rda' and 'data/*.RData' files, and reports on those large than 100Kb. A more complete check (including of the type of compression, but potentially much slower) can be switched on by setting environment variable _R_CHECK_COMPACT_DATA2_ to 'TRUE'.
  The types of files in the 'data' directory are now checked, as packages are *still* misusing it for non-R data files.
  It now extracts and runs the R code for each vignette in a separate directory and R process: this is done in the package's declared encoding. Rather than call tools::checkVignettes(), it calls tools::buildVignettes() to see if the vignettes can be re-built as they would be by R CMD build. Option '--use-valgrind' now applies only to these runs, and not when running code to rebuild the vignettes. This version does a much better job of suppressing output from successful vignette tests.
  The '00check.log' file is a more complete record of what is output to 'stdout': in particular contains more details of the tests.
  It now checks all syntactically valid Rd usage entries, and warns about assignments (unless these give the usage of replacement functions).
  '.tar.xz' compressed tarballs are now allowed, if tar supports them (and setting environment variable TAR to 'internal' ensures so on all platforms).
- R CMD check now warns if it finds 'inst/doc/makefile', and R CMD build renames such a file to 'inst/doc/Makefile'.

INSTALLATION:

- Installing R no longer tries to find perl, and R CMD no longer tries to substitute a full path for awk nor perl – this was a legacy from the days when they were used by R itself. Because a couple of packages do use awk, it is set as the make (rather than environment) variable AWK.
- make check will now fail if there are differences from the reference output when testing package examples and if environment variable R_STRICT_PACKAGE_CHECK is set to a true value.
- The C99 double complex type is now required.
  The C99 complex trigonometric functions (such as 'csin') are not currently required (FreeBSD lacks most of them): substitutes are used if they are missing.
- The C99 system call 'va_copy' is now required.

- If environment variable R_LD_LIBRARY_PATH is set during configuration (for example in 'config.site') it is used unchanged in file 'etc/ldpaths' rather than being appended to.
- configure looks for support for OpenMP and if found compiles R with appropriate flags and also makes them available for use in packages: see 'Writing R Extensions'. This is currently experimental, and is only used in R with a single thread for colSums() and colMeans(). Expect it to be more widely used in later versions of R.
  This can be disabled by the '--disable-openmp' flag.

PACKAGE INSTALLATION:

- R CMD INSTALL --clean now removes copies of a 'src' directory which are created when multiple sub-architectures are in use. (Following a comment from Berwin Turlach.)
- File 'R.css' is now installed on a per-package basis (in the package's 'html' directory) rather than in each library tree, and this is used for all the HTML pages in the package. This helps when installing packages with static HTML pages for use on a webserver. It will also allow future versions of R to use different stylesheets for the packages they install.
- A top-level file '.Rinstignore' in the package sources can list (in the same way as '.Rbuildignore') files under inst that should not be installed. (Why should there be any such files? Because all the files needed to re-build vignettes need to be under inst/doc, but they may not need to be installed.)
- R CMD INSTALL has a new option '--compact-docs' to compact any PDFs under the 'inst/doc' directory. Currently this uses qpdf, which must be installed (see 'Writing R Extensions').
- There is a new option '--lock' which can be used to cancel the effect of '--no-lock' or '--pkglock' earlier on the command line.
- Option '--pkglock' can now be used with more than one package, and is now the default if only one package is specified.
- Argument lock of install.packages() can now be use for Mac binary installs as well as for Windows ones. The value "pkglock" is now accepted, as well as TRUE and FALSE (the default).
- There is a new option '--no-clean-on-error' for R CMD INSTALL to retain a partially installed package for forensic analysis.
- Packages with names ending in '.' are not portable since Windows does not work correctly with such directory names. This is now warned about in R CMD check, and will not be allowed in R 2.14.x.
- The vignette indices are more comprehensive (in the style of browseVignetttes()).

DEPRECATED & DEFUNCT:

- require(save = TRUE) is defunct, and use of the save argument is deprecated.
- R CMD check --no-latex is defunct: use '--no-manual' instead.
- R CMD Sd2Rd is defunct.
- The gamma argument to hsv(), rainbow(), and rgb2hsv() is deprecated and no longer has any effect.
- The previous options for R CMD build --binary ('--auto-zip', '--use-zip-data' and '--no-docs') are deprecated (or defunct): use the new option '--install-args' instead.
- When a character value is used for the EXPR argument in switch(), only a single unnamed alternative value is now allowed.

- The wrapper `utils::link.html.help()` is no longer available.
- Zip-ing data sets in packages (and hence `R CMD INSTALL` options '`--use-zip-data`' and '`--auto-zip`', as well as the '`ZipData: yes`' field in a `DESCRIPTION` file) is defunct.
  Installed packages with zip-ed data sets can still be used, but a warning that they should be re-installed will be given.
- The 'experimental' alternative specification of a namespace via `.Export()` etc is now defunct.
- The option '`--unsafe`' to `R CMD INSTALL` is deprecated: use the identical option '`--no-lock`' instead.
- The entry point `pythag` in '`Rmath.h`' is deprecated in favour of the C99 function `hypot`. A wrapper for `hypot` is provided for R 2.13.x only.
- Direct access to the `"source"` attribute of functions is deprecated; use `deparse(fn, control="useSource")` to access it, and `removeSource(fn)` to remove it.
- `R CMD build --binary` is now formally deprecated: `R CMD INSTALL --build` has long been the preferred alternative.
- Single-character package names are deprecated (and **R** is already disallowed to avoid confusion in '`Depends:`' fields).

BUG FIXES:

- `drop.terms` and the `[` method for class `"terms"` no longer add back an intercept. (Reported by Niels Hansen.)
- `aggregate` preserves the class of a column (e.g., a date) under some circumstances where it discarded the class previously.
- `p.adjust()` now always returns a vector result, as documented. In previous versions it copied attributes (such as dimensions) from the `p` argument: now it only copies names.
- On PDF and PostScript devices, a line width of zero was recorded verbatim and this caused problems for some viewers (a very thin line combined with a non-solid line dash pattern could also cause a problem). On these devices, the line width is now limited at 0.01 and for very thin lines with complex dash patterns the device may force the line dash pattern to be solid. (Reported by Jari Oksanen.)
- The `str()` method for class `"POSIXt"` now gives sensible output for 0-length input.
- The one- and two-argument complex maths functions failed to warn if NAs were generated (as their numeric analogues do).
- Added `.requireCachedGenerics` to the `dont.mind` list for `library()` to avoid warnings about duplicates.
- `$<-.data.frame` messed with the class attribute, breaking any S4 subclass. The S4 `data.frame` class now has its own `$<-` method, and turns dispatch on for this primitive.
- `Map()` did not look up a character argument `f` in the correct frame, thanks to lazy evaluation. (PR#14495)
- `file.copy()` did not tilde-expand `from` and `to` when `to` was a directory. (PR#14507)
- It was possible (but very rare) for the loading test in `R CMD INSTALL` to crash a child R process and so leave around a lock directory and a partially installed package. That test is now done in a separate process.
- `plot(<formula>, data=<matrix>,..)` now works in more cases; similarly for `points()`, `lines()` and `text()`.
- `edit.default()` contained a manual dispatch for matrices (the `"matrix"` class didn't really exist when it was written). This caused an infinite recursion in the no-GUI case and has now been removed.

- `data.frame(check.rows = TRUE)` sometimes worked when it should have detected an error. (PR#14530)
- `scan(sep= , strip.white=TRUE)` sometimes stripped trailing spaces from within quoted strings. (The real bug in PR#14522.)
- The rank-correlation methods for `cor()` and `cov()` with `use = "complete.obs"` computed the ranks before removing missing values, whereas the documentation implied incomplete cases were removed first. (PR#14488)
  They also failed for 1-row matrices.
- The perpendicular adjustment used in placing text and expressions in the margins of plots was not scaled by `par("mex")`. (Part of PR#14532.)
- Quartz Cocoa device now catches any Cocoa exceptions that occur during the creation of the device window to prevent crashes. It also imposes a limit of 144 ft^2 on the area used by a window to catch user errors (unit misinterpretation) early.
- The browser (invoked by `debug()`, `browser()` or otherwise) would display attributes such as `"wholeSrcref"` that were intended for internal use only.
- R's internal filename completion now properly handles filenames with spaces in them even when the readline library is used. This resolves PR#14452 provided the internal filename completion is used (e.g., by setting `rc.settings(files = TRUE)`).
- Inside `uniroot(f, ...)`, `-Inf` function values are now replaced by a maximally **negative** value.
- `rowsum()` could silently over/underflow on integer inputs (reported by Bill Dunlap).
- `as.matrix()` did not handle `"dist"` objects with zero rows.

CHANGES IN R VERSION 2.12.2 patched

NEW FEATURES:

- `max()` and `min()` work harder to ensure that `NA` has precedence over `NaN`, so e.g. `min(NaN, NA)` is `NA`. (This was not previously documented except for within a single numeric vector, where compiler optimizations often defeated the code.)

BUG FIXES:

- A change to the C function '`R_tryEval`' had broken error messages in S4 method selection; the error message is now printed.
- PDF output with a non-RGB color model used RGB for the line stroke color. (PR#14511)
- `stats4::BIC()` assumed without checking that an object of class `"logLik"` has an `"nobs"` attribute: `glm()` fits did not and so `BIC()` failed for them.
- In some circumstances a one-sided `mantelhaen.test()` reported the p-value for the wrong tail. (PR#14514)
- Passing the invalid value `lty = NULL` to `axis()` sent an invalid value to the graphics device, and might cause the device to segfault.
- `Sweave()` with `concordance=TRUE` could lead to invalid PDF files; '`Sweave.sty`' has been updated to avoid this.
- Non-ASCII characters in the titles of help pages were not rendered properly in some locales, and could cause errors or warnings.
- `checkRd()` gave a spurious error if the `\href` macro was used.

CHANGES IN R VERSION 2.12.2

SIGNIFICANT USER-VISIBLE CHANGES:

- Complex arithmetic (notably `z^n` for complex `z` and integer `n`) gave incorrect results since R 2.10.0 on platforms without C99 complex support. This and some lesser issues in trigonometric functions have been corrected.
  Such platforms were rare (we know of Cygwin and FreeBSD). However, because of new compiler optimizations in the way complex arguments are handled, the same code was selected on x86_64 Linux with `gcc 4.5.x` at the default `-O2` optimization (but not at `-O`).
- There is a workaround for crashes seen with several packages on systems using '`zlib 1.2.5`': see the INSTALLATION section.

NEW FEATURES:

- PCRE has been updated to 8.12 (two bug-fix releases since 8.10).
- `rep()`, `seq()`, `seq.int()` and `seq_len()` report more often when the first element is taken of an argument of incorrect length.
- The Cocoa back-end for the `quartz()` graphics device on Mac OS X provides a way to disable event loop processing temporarily (useful, e.g., for forked instances of R).
- `kernel()`'s default for `m` was not appropriate if `coef` was a set of coefficients. (Reported by Pierre Chausse.)
- `bug.report()` has been updated for the current R bug tracker, which does not accept emailed submissions.
- `R CMD check` now checks for the correct use of '`$(LAPACK_LIBS)`' (as well as '`$(BLAS_LIBS)`'), since several CRAN recent submissions have ignored 'Writing R Extensions'.

INSTALLATION:

- The '`zlib`' sources in the distribution are now built with all symbols remapped: this is intended to avoid problems seen with packages such as **XML** and **rggobi** which link to '`zlib.so.1`' on systems using '`zlib 1.2.5`'.
- The default for `FFLAGS` and `FCFLAGS` with `gfortran` on x86_64 Linux has been changed back to '`-g -O2`': however, setting '`-g -O`' may still be needed for `gfortran 4.3.x`.

PACKAGE INSTALLATION:

- A '`LazyDataCompression`' field in the '`DESCRIPTION`' file will be used to set the value for the '`--data-compress`' option of `R CMD INSTALL`.
- Files '`R/sysdata.rda`' of more than 1Mb are now stored in the lazyload database using `xz` compression: this for example halves the installed size of package **Imap**.
- `R CMD INSTALL` now ensures that directories installed from '`inst`' have search permission for everyone.
  It no longer installs files '`inst/doc/Rplots.ps`' and '`inst/doc/Rplots.pdf`'. These are almost certainly left-overs from `Sweave` runs, and are often large.

DEPRECATED & DEFUNCT:

- The 'experimental' alternative specification of a namespace via `.Export()` etc is now deprecated.
- `zip.file.extract()` is now deprecated.

- Zip-ing data sets in packages (and hence `R CMD INSTALL --use-zip-data` and the '`ZipData: yes`' field in a `DESCRIPTION` file) is deprecated: using efficiently compressed '`.rda`' images and lazy-loading of data has superseded it.

BUG FIXES:

- `identical()` could in rare cases generate a warning about non-pairlist attributes on CHARSXPs. As these are used for internal purposes, the attribute check should be skipped. (Reported by Niels Richard Hansen).
- If the filename extension (usually '`.Rnw`') was not included in a call to `Sweave()`, source references would not work properly and the `keep.source` option failed. (PR#14459)
- `format.data.frame()` now keeps zero character column names.
- `pretty(x)` no longer raises an error when `x` contains solely non-finite values. (PR#14468)
- The `plot.TukeyHSD()` function now uses a line width of 0.5 for its reference lines rather than '`lwd = 0`' (which caused problems for some PDF and PostScript viewers).
- The `big.mark` argument to `prettyNum()`, `format()`, etc. was inserted reversed if it was more than one character long.
- `R CMD check` failed to check the filenames under '`man`' for Windows' reserved names.
- The `"Date"` and `"POSIXt"` methods for `seq()` could overshoot when `to` was supplied and `by` was specified in months or years.
- The internal method of `untar()` now restores hard links as file copies rather than symbolic links (which did not work for cross-directory links).
- `unzip()` did not handle zip files which contained filepaths with two or more leading directories which were not in the zipfile and did not already exist. (It is unclear if such zipfiles are valid and the third-party C code used did not support them, but PR#14462 created one.)
- `combn(n, m)` now behaves more regularly for the border case $m = 0$. (PR#14473)
- The rendering of numbers in plotmath expressions (e.g., `expression(10^2)`) used the current settings for conversion to strings rather than setting the defaults, and so could be affected by what has been done before. (PR#14477)
- The methods of `napredict()` and `naresid()` for `na.action = na.exclude` fits did not work correctly in the very rare event that every case had been omitted in the fit. (Reported by Simon Wood.)
- `weighted.residuals(drop0=TRUE)` returned a vector when the residuals were a matrix (e.g., those of class `"mlm"`). (Reported by Bill Dunlap.)
- Package HTML index files '`<pkg>/html/00Index.html`' were generated with a stylesheet reference that was not correct for static browsing in libraries.
- `ccf(na.action = na.pass)` was not implemented.
- The parser accepted some incorrect numeric constants, e.g. `20x2`. (Reported by Olaf Mersmann.)
- `format(*, zero.print)` did not always replace the full zero parts.
- Fixes for subsetting or subassignment of `"raster"` objects when not both `i` and `j` are specified.
- `R CMD INSTALL` was not always respecting the '`ZipData: yes`' field of a '`DESCRIPTION`' file (although this is frequently incorrectly specified for packages with no data or which specify lazy-loading of data).
  `R CMD INSTALL --use-zip-data` was incorrectly implemented as '`--use-zipdata`' since R 2.9.0.

- `source(file, echo=TRUE)` could fail if the file contained '`#line`' directives. It now recovers more gracefully, but may still display the wrong line if the directive gives incorrect information.
- `atan(1i)` returned `NaN+Infi` (rather than `0+Infi`) on platforms without C99 complex support.
- `library()` failed to cache S4 metadata (unlike `loadNamespace()`) causing failures in S4-using packages without a namespace (e.g., those using reference classes).
- The function `qlogis(lp, log.p=TRUE)` no longer prematurely overflows to `Inf` when exp(lp) is close to 1.
- Updating S4 methods for a group generic function requires resetting the methods tables for the members of the group (patch contributed by Martin Morgan).
- In some circumstances (including for package **XML**), `R CMD INSTALL` installed version-control directories from source packages.
- Added `PROTECT` calls to some constructed expressions used in C level `eval` calls.
- `utils:::create.post()` (used by `bug.report()` and `help.request()`) failed to quote arguments to the mailer, and so often failed.
- `bug.report()` was naive about how to extract maintainer email addresses from package descriptions, so would often try mailing to incorrect addresses.
- `debugger()` could fail to read the environment of a call to a function with a `...` argument. (Reported by Charlie Roosen.)
- `prettyNum(c(1i, NA), drop0=TRUE)` or `str(NA_complex_)` now work correctly.

CHANGES IN R VERSION 2.12.1

NEW FEATURES:

- The DVI/PDF reference manual now includes the help pages for all the standard packages: **splines**, **stats4** and **tcltk** were previously omitted (intentionally).
- `http://www.rforge.net` has been added to the default set of repositories known to `setRepositories()`.
- xz-utils has been updated to version 5.0.0.
- `reshape()` now makes use of `sep` when forming names during reshaping to wide format. (PR#14435)
- `legend()` allows the length of lines to be set by the end user *via* the new argument `seg.len`.
- New S4 reference class utility methods `copy()`, `field()`, `getRefClass()` and `getClass()` have been added to package **methods**.
- When a character value is used for the `EXPR` argument in `switch()`, a warning is given if more than one unnamed alternative value is given. This will become an error in R 2.13.0.
- `StructTS(type = "BSM")` now allows series with just two seasons. (Reported by Birgit Erni.)

INSTALLATION:

- The PDF reference manual is now built as PDF version 1.5 with object compression, which on platforms for which this is not the default (notably MiKTeX) halves its size.
- Variable `FCLIBS` can be set during configuration, for any additional library flags needed when linking a shared object with the Fortran 9x compiler. (Needed with Solaris Studio 12.2.)

BUG FIXES:

- `seq.int()` no longer sometimes evaluates arguments twice. (PR#14388)
- The `data.frame` method of `format()` failed if a column name was longer than 256 bytes (the maximum length allowed for an R name).
- `predict(<lm object>, type ="terms", ...)` failed if both `terms` and `interval` were specified. (Reported by Bill Dunlap.)
  Also, if `se.fit = TRUE` the standard errors were reported for all terms, not just those selected by a non-null `terms`.
- The TRE regular expressions engine could terminate R rather than give an error when given certain invalid regular expressions. (PR#14398)
- `cmdscale(eig = TRUE)` was documented to return $n - 1$ eigenvalues but in fact only returned `k`. It now returns all n eigenvalues.
  `cmdscale(add = TRUE)` failed to centre the return configuration and sometimes lost the labels on the points. Its return value was described wrongly (it is always a list and contains component `ac`).
- `promptClass()` in package **methods** now works for reference classes and gives a suitably specialized skeleton of documentation.
  Also, `callSuper()` now works via the `methods()` invocation as well as for initially specified methods.
- `download.file()` could leave the destination file open if the URL was not able to be opened. (PR#14414)
- Assignment of an environment to functions or as an attribute to other objects now works for S4 subclasses of `"environment"`.
- Use of '`[[<-`' for S4 subclasses of `"environment"` generated an infinite recursion from the method. The method has been replaced by internal code.
- In a reference class S4 method, `callSuper()` now works in `initialize()` methods when there is no explicit superclass method.
- '`!`' dropped attributes such as names and dimensions from a length-zero argument. (PR#14424)
- When `list2env()` created an environment it was missing a `PROTECT` call and so was vulnerable to garbage collection.
- `Sweave()` with `keep.source=TRUE` dropped comments at the start and end of code chunks. It could also fail when '`\SweaveInput`' was combined with named chunks.
- The Fortran code used by `nls(algorithm = "port")` could infinite-loop when compiled with high optimization on a modern version of `gcc`, and `SAFE_FFLAGS` is now used to make this less likely. (PR#14427, seen with 32-bit Windows using `gcc 4.5.0` used from R 2.12.0.)
- `sapply()` with default `simplify = TRUE` and `mapply()` with default `SIMPLIFY = TRUE` wrongly simplified language-like results, as, e.g., in `mapply(1:2, c(3,7), FUN = function(i,j) call(':',i,j))`.
- Backreferences to undefined patterns in `[g]sub(pcre = TRUE)` could cause a segfault. (PR#14431)
- The `format()` (and hence the `print()`) method for class `"Date"` rounded fractional dates towards zero: it now always rounds them down.
- Reference S4 class creation could generate ambiguous inheritance patterns under very special circumstances.
- '`[[<-`' turned S4 subclasses of `"environment"` into plain environments.
- Long titles for help pages were truncated in package indices and a few other places.
- Additional utilities now work correctly with S4 subclasses of `"environment"` (`rm`, locking tools and active bindings).

- `spec.ar()` now also work for the `"ols"` method. (Reported by Hans-Ruedi Kuensch.)
- The initialization of objects from S4 subclasses of `"environment"` now allocates a new environment object.
- `R CMD check` has more protection against (probably erroneous) example or test output which is invalid in the current locale.
- `qr.X()` with column names and pivoting now also pivots the column names. (PR#14438)
- `unit.pmax()` and `unit.pmin()` in package **grid** gave incorrect results when all inputs were of length 1. (PR#14443)
- The parser for '`NAMESPACE`' files ignored misspelled directives, rather than signalling an error. For 2.12.x a warning will be issued, but this will be correctly reported as an error in later releases. (Reported by Charles Berry.)
- Fix for subsetting of `"raster"` objects when only one of `i` or `j` is specified.
- `grid.raster()` in package **grid** did not accept `"nativeRaster"` objects (like `rasterImage()` does).
- Rendering raster images in PDF output was resetting the clipping region.
- Rendering of raster images on cairo X11 device was wrong, particularly when a small image was being scaled up using interpolation.
  With cairo < 1.6, will be better than before, though still a little clunky. With cairo >= 1.6, should be sweet as.
- Several bugs fixed in `read.DIF()`: single column inputs caused errors, cells marked as `"character"` could be converted to other types, and (in Windows) copying from the clipboard failed.

CHANGES IN R VERSION 2.12.0

NEW FEATURES:

- Reading a package's '`CITATION`' file now defaults to ASCII rather than Latin-1: a package with a non-ASCII '`CITATION`' file should declare an encoding in its '`DESCRIPTION`' file and use that encoding for the '`CITATION`' file.
- `difftime()` now defaults to the `"tzone"` attribute of `"POSIXlt"` objects rather than to the current timezone as set by the default for the `tz` argument. (Wish of PR#14182.)
- `pretty()` is now generic, with new methods for `"Date"` and `"POSIXt"` classes (based on code contributed by Felix Andrews).
- `unique()` and `match()` are now faster on character vectors where all elements are in the global `CHARSXP` cache and have unmarked encoding (ASCII). Thanks to Matthew Dowle for suggesting improvements to the way the hash code is generated in '`unique.c`'.
- The `enquote()` utility, in use internally, is exported now.
- `.C()` and `.Fortran()` now map non-zero return values (other than `NA_LOGICAL`) for logical vectors to `TRUE`: it has been an implicit assumption that they are treated as true.
- The `print()` methods for `"glm"` and `"lm"` objects now insert linebreaks in long calls in the same way that the `print()` methods for `"summary.[g]lm"` objects have long done. This does change the layout of the examples for a number of packages, e.g. **MASS**. (PR#14250)

- `constrOptim()` can now be used with method `"SANN"`. (PR#14245)
  It gains an argument `hessian` to be passed to `optim()`, which allows all the `...` arguments to be intended for `f()` and `grad()`. (PR#14071)
- `curve()` now allows `expr` to be an object of mode `"expression"` as well as `"call"` and `"function"`.
- The `"POSIX[cl]t"` methods for `Axis()` have been replaced by a single method for `"POSIXt"`.
  There are no longer separate `plot()` methods for `"POSIX[cl]t"` and `"Date"`: the default method has been able to handle those classes for a long time. This *inter alia* allows a single date-time object to be supplied, the wish of PR#14016.
  The methods had a different default (`""`) for `xlab`.
- Classes `"POSIXct"`, `"POSIXlt"` and `"difftime"` have generators `.POSIXct()`, `.POSIXlt()` and `.difftime()`. Package authors are advised to make use of them (they are available from R 2.11.0) to proof against planned future changes to the classes.
  The ordering of the classes has been changed, so `"POSIXt"` is now the second class. See the document 'Updating packages for changes in R 2.12.x' on `http://developer.r-project.org` for the consequences for a handful of CRAN packages.
- The `"POSIXct"` method of `as.Date()` allows a timezone to be specified (but still defaults to UTC).
- New `list2env()` utility function as an inverse of `as.list(<environment>)` and for fast multi-`assign()` to existing environment. `as.environment()` is now generic and uses `list2env()` as list method.
- There are several small changes to output which 'zap' small numbers, e.g. in printing quantiles of residuals in summaries from `"lm"` and `"glm"` fits, and in test statistics in `print.anova()`.
- Special names such as `"dim"`, `"names"`, etc, are now allowed as slot names of S4 classes, with `"class"` the only remaining exception.
- File '`.Renviron`' can have architecture-specific versions such as '`.Renviron.i386`' on systems with sub-architectures.
- `installed.packages()` has a new argument `subarch` to filter on sub-architecture.
- The `summary()` method for `packageStatus()` now has a separate `print()` method.
- The default `summary()` method returns an object inheriting from class `"summaryDefault"` which has a separate `print()` method that calls `zapsmall()` for numeric/complex values.
- The startup message now includes the platform and if used, sub-architecture: this is useful where different (sub-)architectures run on the same OS.
- The `getGraphicsEvent()` mechanism now allows multiple windows to return graphics events, through the new functions `setGraphicsEventHandlers()`, `setGraphicsEventEnv()`, and `getGraphicsEventEnv()`. (Currently implemented in the `windows()` and `X11()` devices.)
- `tools::texi2dvi()` gains an `index` argument, mainly for use by `R CMD Rd2pdf`.
  It avoids the use of `texindy` by Texinfo's `texi2dvi` >= 1.157, since that does not emulate 'makeindex' well enough to avoid problems with special characters (such as '`(`', '`{`', '`!`') in indices.
- The ability of `readLines()` and `scan()` to re-encode inputs to marked UTF-8 strings on Windows since R 2.7.0 is extended to non-UTF-8 locales on other OSes.
- `scan()` gains a `fileEncoding` argument to match `read.table()`.
- `points()` and `lines()` gain `"table"` methods to match `plot()`. (Wish of PR#10472.)

- `Sys.chmod()` allows argument `mode` to be a vector, recycled along `paths`.
- There are `|`, `&` and `xor()` methods for classes `"octmode"` and `"hexmode"`, which work bitwise.
- Environment variables `R_DVIPSCMD`, `R_LATEXCMD`, `R_MAKEINDEXCMD`, `R_PDFLATEXCMD` are no longer used nor set in an R session. (With the move to `tools::texi2dvi()`, the conventional environment variables `LATEX`, `MAKEINDEX` and `PDFLATEX` will be used. `options("dvipscmd")` defaults to the value of `DVIPS`, then to `"dvips"`.)
- New function `isatty()` to see if terminal connections are redirected.
- `summaryRprof()` returns the sampling interval in component `sample.interval` and only returns in `by.self` data for functions with non-zero self times.
- `print(x)` and `str(x)` now indicate if an empty list `x` is named.
- `install.packages()` and `remove.packages()` with `lib` unspecified and multiple libraries in `.libPaths()` inform the user of the library location used with a message rather than a warning.
- There is limited support for multiple compressed streams on a file: all of `[bgx]zfile()` allow streams to be appended to an existing file, but `bzfile()` reads only the first stream.
- Function `person()` in package **utils** now uses a given/family scheme in preference to first/middle/last, is vectorized to handle an arbitrary number of persons, and gains a `role` argument to specify person roles using a controlled vocabulary (the MARC relator terms).
- Package **utils** adds a new `"bibentry"` class for representing and manipulating bibliographic information in enhanced BibTeX style, unifying and enhancing the previously existing mechanisms.
- A `bibstyle()` function has been added to the **tools** package with default JSS style for rendering `"bibentry"` objects, and a mechanism for registering other rendering styles.
- Several aspects of the display of text help are now customizable using the new `Rd2txt_options()` function. options(`"help_text_width"`) is no longer used.
- Added '`\href`' tag to the Rd format, to allow hyperlinks to URLs without displaying the full URL.
- Added '`\newcommand`' and '`\renewcommand`' tags to the Rd format, to allow user-defined macros.
- New `toRd()` generic in the **tools** package to convert objects to fragments of Rd code, and added `"fragment"` argument to `Rd2txt()`, `Rd2HTML()`, and `Rd2latex()` to support it.
- Directory '`R_HOME/share/texmf`' now follows the TDS conventions, so can be set as a `texmf` tree ('root directory' in MiKTeX parlance).
- S3 generic functions now use correct S4 inheritance when dispatching on an S4 object. See `?Methods`, section on "Methods for S3 Generic Functions" for recommendations and details.
- `format.pval()` gains a `...` argument to pass arguments such as `nsmall` to `format()`. (Wish of PR#9574)
- `legend()` supports `title.adj`. (Wish of PR#13415)
- Added support for subsetting `"raster"` objects, plus assigning to a subset, conversion to a matrix (of colour strings), and comparisons ('`==`' and '`!=`').
- Added a new `parseLatex()` function (and related functions `deparseLatex()` and `latexToUtf8()`) to support conversion of bibliographic entries for display in R.
- Text rendering of '`\itemize`' in help uses a Unicode bullet in UTF-8 and most single-byte Windows locales.

- Added support for polygons with holes to the graphics engine. This is implemented for the `pdf()`, `postscript()`, `x11(type="cairo")`, `windows()`, and `quartz()` devices (and associated raster formats), but not for `x11(type="Xlib")` or `xfig()` or `pictex()`. The user-level interface is the `polypath()` function in **graphics** and `grid.path()` in **grid**.
- File '`NEWS`' is now generated at installation with a slightly different format: it will be in UTF-8 on platforms using UTF-8, and otherwise in ASCII. There is also a PDF version, '`NEWS.pdf`', installed at the top-level of the R distribution.
- `kmeans(x, 1)` now works. Further, `kmeans` now returns between and total sum of squares.
- `arrayInd()` and `which()` gain an argument `useNames`. For `arrayInd`, the default is now false, for speed reasons.
- As is done for closures, the default `print` method for the formula class now displays the associated environment if it is not the global environment.
- A new facility has been added for inserting code into a package without re-installing it, to facilitate testing changes which can be selectively added and backed out. See `?insertSource`.
- New function `readRenviron` to (re-)read files in the format of '`~/.Renviron`' and '`Renviron.site`'.
- `require()` will now return `FALSE` (and not fail) if loading the package or one of its dependencies fails.
- `aperm()` now allows argument `perm` to be a character vector when the array has named dimnames (as the results of `table()` calls do). Similarly, `array()` allows `MARGIN` to be a character vector. (Based on suggestions of Michael Lachmann.)
- Package **utils** now exports and documents functions `aspell_package_Rd_files()` and `aspell_package_vignettes()` for spell checking package Rd files and vignettes using Aspell, Ispell or Hunspell.
- Package news can now be given in Rd format, and `news()` prefers these '`inst/NEWS.Rd`' files to old-style plain text '`NEWS`' or '`inst/NEWS`' files.
- New simple function `packageVersion()`.
- The PCRE library has been updated to version 8.10.
- The standard Unix-alike terminal interface declares its name to readline as 'R', so that can be used for conditional sections in '`~/.inputrc`' files.
- 'Writing R Extensions' now stresses that the standard sections in '`.Rd`' files (other than '`\alias`', '`\keyword`' and '`\note`') are intended to be unique, and the conversion tools now drop duplicates with a warning.
  The '`.Rd`' conversion tools also warn about an unrecognized type in a '`\docType`' section.
- `ecdf()` objects now have a `quantile()` method.
- `format()` methods for date-time objects now attempt to make use of a `"tzone"` attribute with `"%Z"` and `"%z"` formats, but it is not always possible. (Wish of PR#14358.)
- `tools::texi2dvi(file, clean = TRUE)` now works in more cases (e.g., where emulation is used and when '`file`' is not in the current directory).
- New function `droplevels()` to remove unused factor levels.
- `system(command, intern = TRUE)` now gives an error on a Unix-alike (as well as on Windows) if `command` cannot be run. It reports a non-success exit status from running `command` as a warning.
  On a Unix-alike an attempt is made to return the actual exit status of the command in `system(intern = FALSE)`: previously this had been system-dependent but on POSIX-compliant systems the value return was 256 times the status.

- `system()` has a new argument `ignore.stdout` which can be used to (portably) ignore standard output.
- `system(intern = TRUE)` and `pipe()` connections are guaranteed to be available on all builds of R.
- `Sys.which()` has been altered to return `""` if the command is not found (even on Solaris).
- A facility for defining reference-based S4 classes (in the OOP style of Java, C++, etc.) has been added experimentally to package **methods**; see `?ReferenceClasses`.
- The `predict` method for `"loess"` fits gains an `na.action` argument which defaults to `na.pass` rather than the previous default of `na.omit`.
  Predictions from `"loess"` fits are now named from the row names of `newdata`.
- Parsing errors detected during `Sweave()` processing will now be reported referencing their original location in the source file.
- New `adjustcolor()` utility, e.g., for simple translucent color schemes.
- `qr()` now has a trivial `lm` method with a simple (fast) validity check.
- An experimental new programming model has been added to package **methods** for reference (OOP-style) classes and methods. See `?ReferenceClasses`.
- bzip2 has been updated to version 1.0.6 (bug-fix release). '`--with-system-bzlib`' now requires at least version 1.0.6.
- R now provides '`jss.cls`' and '`jss.bst`' (the class and bib style file for the Journal of Statistical Software) as well as '`RJournal.bib`' and '`Rnews.bib`', and `R CMD` ensures that the '`.bst`' and '`.bib`' files are found by BibTeX.
- Functions using the `TAR` environment variable no longer quote the value when making `system` calls. This allows values such as '`tar --force-local`', but does require additional quotes in, e.g., `TAR = "'/path with spaces/mytar'"`.

DEPRECATED & DEFUNCT:

- Supplying the parser with a character string containing both octal/hex and Unicode escapes is now an error.
- File extension '`.C`' for C++ code files in packages is now defunct.
- `R CMD check` no longer supports configuration files containing Perl configuration variables: use the environment variables documented in 'R Internals' instead.
- The `save` argument of `require()` now defaults to `FALSE` and `save = TRUE` is now deprecated. (This facility is very rarely actually used, and was superseded by the '`Depends`' field of the '`DESCRIPTION`' file long ago.)
- `R CMD check --no-latex` is deprecated in favour of '`--no-manual`'.
- `R CMD Sd2Rd` is formally deprecated and will be removed in R 2.13.0.

PACKAGE INSTALLATION:

- `install.packages()` has a new argument `libs_only` to optionally pass '`--libs-only`' to `R CMD INSTALL` and works analogously for Windows binary installs (to add support for 64- or 32-bit Windows).
- When sub-architectures are in use, the installed architectures are recorded in the `Archs` field of the '`DESCRIPTION`' file. There is a new default filter, `"subarch"`, in `available.packages()` to make use of this.
  Code is compiled in a copy of the '`src`' directory when a package is installed for more than one sub-architecture: this avoid problems with cleaning the sources between building sub-architectures.
- `R CMD INSTALL --libs-only` no longer overrides the setting of locking, so a previous version of the package will be restored unless '`--no-lock`' is specified.

UTILITIES:

- `R CMD Rprof|build|check` are now based on R rather than Perl scripts. The only remaining Perl scripts are the deprecated `R CMD Sd2Rd` and `install-info.pl` (used only if `install-info` is not found) as well as some maintainer-mode-only scripts.
  NB: because these have been completely rewritten, users should not expect undocumented details of previous implementations to have been duplicated.
  `R CMD` no longer manipulates the environment variables `PERL5LIB` and `PERLLIB`.
- `R CMD check` has a new argument '`--extra-arch`' to confine tests to those needed to check an additional sub-architecture.
  Its check for "Subdirectory 'inst' contains no files" is more thorough: it looks for files, and warns if there are only empty directories.
  Environment variables such as `R_LIBS` and those used for customization can be set for the duration of checking *via* a file '`~/.R/check.Renviron`' (in the format used by '`.Renviron`', and with sub-architecture specific versions such as '`~/.R/check.Renviron.i386`' taking precedence).
  There are new options '`--multiarch`' to check the package under all of the installed sub-architectures and '`--no-multiarch`' to confine checking to the sub-architecture under which `check` is invoked. If neither option is supplied, a test is done of installed sub-architectures and all those which can be run on the current OS are used.
  Unless multiple sub-architectures are selected, the install done by `check` for testing purposes is only of the current sub-architecture (*via* `R CMD INSTALL --no-multiarch`).
  It will skip the check for non-ascii characters in code or data if the environment variables `_R_CHECK_ASCII_CODE_` or `_R_CHECK_ASCII_DATA_` are respectively set to `FALSE`. (Suggestion of Vince Carey.)
- `R CMD build` no longer creates an '`INDEX`' file (`R CMD INSTALL` does so), and '`--force`' removes (rather than overwrites) an existing '`INDEX`' file.
  It supports a file '`~/.R/build.Renviron`' analogously to `check`.
  It now runs build-time '`\Sexpr`' expressions in help files.
- `R CMD Rd2dvi` makes use of `tools::texi2dvi()` to process the package manual. It is now implemented entirely in R (rather than partially as a shell script).
- `R CMD Rprof` now uses `utils::summaryRprof()` rather than Perl. It has new arguments to select one of the tables and to limit the number of entries printed.
- `R CMD Sweave` now runs R with '`--vanilla`' so the environment setting of `R_LIBS` will always be used.

C-LEVEL FACILITIES:

- `lang5()` and `lang6()` (in addition to pre-existing `lang[1-4]()`) convenience functions for easier construction of `eval()` calls. If you have your own definition, do wrap it inside `#ifndef lang5 .... #endif` to keep it working with old and new R.
- Header '`R.h`' now includes only the C headers it itself needs, hence no longer includes `errno.h`. (This helps avoid problems when it is included from C++ source files.)
- Headers '`Rinternals.h`' and '`R_ext/Print.h`' include the C++ versions of '`stdio.h`' and '`stdarg.h`' respectively if included from a C++ source file.

INSTALLATION:

- A C99 compiler is now required, and more C99 language features will be used in the R sources.
- Tcl/Tk >= 8.4 is now required (increased from 8.3).
- System functions `access`, `chdir` and `getcwd` are now essential to configure R. (In practice they have been required for some time.)

- `make check` compares the output of the examples from several of the base packages to reference output rather than the previous output (if any). Expect some differences due to differences in floating-point computations between platforms.
- File '`NEWS`' is no longer in the sources, but generated as part of the installation. The primary source for changes is now '`doc/NEWS.Rd`'.
- The `popen` system call is now required to build R. This ensures the availability of `system(intern = TRUE)`, `pipe()` connections and printing from `postscript()`.
- The `pkg-config` file '`libR.pc`' now also works when R is installed using a sub-architecture.
- R has always required a BLAS that conforms to IE60559 arithmetic, but after discovery of more real-world problems caused by a BLAS that did not, this is tested more thoroughly in this version.

BUG FIXES:

- Calls to `selectMethod()` by default no longer cache inherited methods. This could previously corrupt methods used by `as()`.
- The densities of non-central chi-squared are now more accurate in some cases in the extreme tails, e.g. `dchisq(2000, 2, 1000)`, as a series expansion was truncated too early. (PR#14105)
- `pt()` is more accurate in the left tail for `ncp` large, e.g. `pt(-1000, 3, 200)`. (PR#14069)
- The default C function (`R_binary`) for binary ops now sets the S4 bit in the result if either argument is an S4 object. (PR#13209)
- `source(echo=TRUE)` failed to echo comments that followed the last statement in a file.
- S4 classes that contained one of `"matrix"`, `"array"` or `"ts"` and also another class now accept superclass objects in `new()`. Also fixes failure to call `validObject()` for these classes.
- Conditional inheritance defined by argument `test` in `methods::setIs()` will no longer be used in S4 method selection (caching these methods could give incorrect results). See `?setIs`.
- The signature of an implicit generic is now used by `setGeneric()` when that does not use a definition nor explicitly set a signature.
- A bug in `callNextMethod()` for some examples with `"..."` in the arguments has been fixed. See file '`src/library/methods/tests/nextWithDots.R`' in the sources.
- `match(x, table)` (and hence `%in%`) now treat `"POSIXlt"` consistently with, e.g., `"POSIXct"`.
- Built-in code dealing with environments (`get()`, `assign()`, `parent.env()`, `is.environment()` and others) now behave consistently to recognize S4 subclasses; `is.name()` also recognizes subclasses.
- The `abs.tol` control parameter to `nlminb()` now defaults to `0.0` to avoid false declarations of convergence in objective functions that may go negative.
- The standard Unix-alike termination dialog to ask whether to save the workspace takes a EOF response as `n` to avoid problems with a damaged terminal connection. (PR#14332)
- Added `warn.unused` argument to `hist.default()` to allow suppression of spurious warnings about graphical parameters used with `plot=FALSE`. (PR#14341)
- `predict.lm()`, `summary.lm()`, and indeed `lm()` itself had issues with residual DF in zero-weighted cases (the latter two only in connection with empty models). (Thanks to Bill Dunlap for spotting the `predict()` case.)

- `aperm()` treated `resize = NA` as `resize = TRUE`.
- `constrOptim()` now has an improved convergence criterion, notably for cases where the minimum was (very close to) zero; further, other tweaks inspired from code proposals by Ravi Varadhan.
- Rendering of S3 and S4 methods in man pages has been corrected and made consistent across output formats.
- Simple markup is now allowed in '`\title`' sections in '`.Rd`' files.
- The behaviour of `as.logical()` on factors (to use the levels) was lost in R 2.6.0 and has been restored.
- `prompt()` did not backquote some default arguments in the '`\usage`' section. (Reported by Claudia Beleites.)
- `writeBin()` disallows attempts to write 2GB or more in a single call. (PR#14362)
- `new()` and `getClass()` will now work if Class is a subclass of `"classRepresentation"` and should also be faster in typical calls.
- The `summary()` method for data frames makes a better job of names containing characters invalid in the current locale.
- `[[` sub-assignment for factors could create an invalid factor (reported by Bill Dunlap).
- `Negate(f)` would not evaluate argument `f` until first use of returned function (reported by Olaf Mersmann).
- `quietly=FALSE` is now also an optional argument of `library()`, and consequently, `quietly` is now propagated also for loading dependent packages, e.g., in `require(*, quietly=TRUE)`.
- If the loop variable in a `for` loop was deleted, it would be recreated as a global variable. (Reported by Radford Neal; the fix includes his optimizations as well.)
- Task callbacks could report the wrong expression when the task involved parsing new code. (PR#14368)
- `getNamespaceVersion()` failed; this was an accidental change in 2.11.0. (PR#14374)
- `identical()` returned `FALSE` for external pointer objects even when the pointer addresses were the same.
- `L$a@x[] <- val` did not duplicate in a case it should have.
- `tempfile()` now always gives a random file name (even if the directory is specified) when called directly after startup and before the R RNG had been used. (PR#14381)
- `quantile(type=6)` behaved inconsistently. (PR#14383)
- `backSpline(.)` behaved incorrectly when the knot sequence was decreasing. (PR#14386)
- The reference BLAS included in R was assuming that `0*x` and `x*0` were always zero (whereas they could be `NA` or `NaN` in IEC 60559 arithmetic). This was seen in results from `tcrossprod`, and for example that `log(0) %*% 0` gave `0`.
- The calculation of whether text was completely outside the device region (in which case, you draw nothing) was wrong for screen devices (which have [0, 0] at top-left). The symptom was (long) text disappearing when resizing a screen window (to make it smaller). (PR#14391)
- `model.frame(drop.unused.levels = TRUE)` did not take into account `NA` values of factors when deciding to drop levels. (PR#14393)
- `library.dynam.unload` required an absolute path for `libpath`. (PR#14385)
  Both `library()` and `loadNamespace()` now record absolute paths for use by `searchpaths()` and `getNamespaceInfo(ns, "path")`.
- The self-starting model `NLSstClosestX` failed if some deviation was exactly zero. (PR#14384)

- `X11(type = "cairo")` (and other devices such as `png` using cairographics) and which use Pango font selection now work around a bug in Pango when very small fonts (those with sizes between 0 and 1 in Pango's internal units) are requested. (PR#14369)
- Added workaround for the font problem with `X11(type = "cairo")` and similar on Mac OS X whereby italic and bold styles were interchanged. (PR#13463 amongst many other reports.)
- `source(chdir = TRUE)` failed to reset the working directory if it could not be determined – that is now an error.
- Fix for crash of `example(rasterImage)` on `x11(type="Xlib")`.
- Force Quartz to bring the on-screen display up-to-date immediately before the snapshot is taken by `grid.cap()` in the Cocoa implementation. (PR#14260)
- `model.frame` had an unstated 500 byte limit on variable names. (Example reported by Terry Therneau.)
- The 256-byte limit on names is now documented.
- Subassignment by `[`, `[[` or `$` on an expression object with value `NULL` coerced the object to a list.

CHANGES IN R VERSION 2.11.1 patched

NEW FEATURES:

- `install.packages()` has a new optional argument `INSTALL_opts` which can be used to pass options to `R CMD INSTALL` for source-package installs.
- `R CMD check` now runs the package-specific tests with `LANGUAGE=en` to facilitate comparison to '`.Rout.save`' files.
- `sessionInfo()` gives more detailed platform information, including 32/64-bit and the sub-architecture if one is used.

DEPRECATED & DEFUNCT:

- The use of Perl configuration variables for `R CMD check` (as previously documented in 'Writing R Extensions') is deprecated and will be removed in R 2.12.0. Use the environment variables documented in 'R Internals' instead.

BUG FIXES:

- `R CMD Rd2dvi` failed if run from a path containing space(s). This also affected `R CMD check`, which calls `Rd2dvi`.
- `stripchart()` could fail with an empty factor level. (PR#14317)
- Text help rendering of '`\tabular{}`' has been improved: under some circumstances leading blank columns were not rendered.
- `strsplit(x, fixed=TRUE)` marked UTF-8 strings with the local encoding when no splits were found.
- `weighted.mean(NA, na.rm=TRUE)` and similar now returns `NaN` again, as it did prior to R 2.10.0.
- `R CMD` had a typo in its detection of whether the environment variable `TEXINPUTS` was set (reported by Martin Morgan).
- The command-line parser could mistake '`--file=size...`' for one of the options for setting limits for Ncells or Vcells.
- The internal `strptime()` could corrupt its copy of the timezone which would then lead to spurious warnings. (PR#14338)

- `dir.create(recursive = TRUE)` could fail if one of the components existed but was a directory on a read-only file system. (Seen on Solaris, where the error code returned is not even listed as possible on the man page.)
- The `postscript()` and `pdf()` devices will now allow `lwd` values less than 1 (they used to force such values to be 1).
- Fixed font face for CID fonts in `pdf()` graphics output. (PR#14326)
- `GERaster()` now checks for width or height of zero and does nothing in those cases; previously the behaviour was undefined, probably device-specific, and possibly dangerous.
- `wilcox.test(x, y, conf.int = TRUE)` failed with an unhelpful message if `x` and `y` were constant vectors, and similarly in the one-sample case. (PR#14329)
- Improperly calling `Recall()` from outside a function could cause a segfault. (Reported by Robert McGehee.)
- '`\Sexpr[result=rd]`' in an Rd file added a spurious newline, which was displayed as extra whitespace when rendered.
- `require(save = TRUE)` recorded the names of packages it failed to load.
- `packageStatus()` could return a data frame with duplicate row names which could then not be printed.
- `txtProgressBar(style = 2)` did not work correctly.
  `txtProgressBar(style = 3)` did not display until a non-minimum value was set.
- `contour()` did not display dashed line types properly when contour lines were labelled. (Reported by David B. Thompson.)
- `tools::undoc()` again detects undocumented data objects. Of course, this also affects `R CMD check`.
- `ksmooth(x,NULL)` no longer segfaults.
- `approxfun()`, `approx()`, `splinefun()` and `spline()` could be confused by `x` values that were different but so close as to print identically. (PR#14377)

CHANGES IN R VERSION 2.11.1

NEW FEATURES:

- `R CMD INSTALL` checks if dependent packages are available early on in the installation of source packages, thereby giving clearer error messages.
- `R CMD INSTALL --build` now names the file in the format used for Mac OS X binary files on that platform.
- `BIC()` in package **stats4** now also works with multiple fitted models, analogously to `AIC()`.

DEPRECATED & DEFUNCT:

- Use of file extension '`.C`' for C++ code in packages is now deprecated: it has caused problems for some `make`s on case-insensitive file systems (although it currently works with the recommended toolkits).

INSTALLATION:

- Command `gnutar` is preferred to `tar` when configure sets `TAR`. This is needed on Mac OS 10.6, where the default `tar`, `bsdtar 2.6.2`, has been reported to produce archives with illegal extensions to tar (according to the POSIX standard).

BUG FIXES:

- The C function `mkCharLenCE` now no longer reads past `len` bytes (unlikely to be a problem except in user code). (PR#14246)
- On systems without any default `LD_LIBRARY_PATH` (not even '`/usr/local/lib`'), `[DY]LIB_LIBRARY_PATH` is now set without a trailing colon. (PR#13637)
- More efficient implementation of `utf8ToInt()` on long multi-byte strings with many multi-byte characters. (PR#14262)
- `aggregate.ts()` gave platform-dependent results due to rounding error for `ndeltat != 1`.
- `package.skeleton()` sometimes failed to fix filenames for '`.R`' or '`.Rd`' files to start with an alphanumeric. (PR#14253)
  It also failed when only an S4 class without any methods was defined. (PR#14280)
- `splinefun(method = "monoH.FC")` was not quite monotone in rare cases. (PR#14215)
- `Rhttpd` no longer crashes due to `SIGPIPE` when the client closes the connection prematurely. (PR#14266)
- `format.POSIXlt()` could cause a stack overflow and crash when used on very long vectors. (PR#14267)
- `Rd2latex()` incorrectly escaped special characters in '`\usage`' sections.
- `mcnemar.test()` could alter the levels (dropping unused levels) if passed `x` and `y` as factors (reported by Greg Snow).
- `Rd2pdf` sometimes needed a further `pdflatex` pass to get hyperlinked pages correct.
- `interaction()` produced malformed results when levels were duplicated, causing segfaults in `split()`.
- `cut(d, breaks = <n>)` now also works for `"Date"` or `"POSIXt"` argument `d`. (PR#14288)
- `memDecompress()` could decompress incompletely rare `xz`-compressed input due to incorrect documentation of `xz utils`. (Report and patch from Olaf Mersmann.)
- The S4 `initialize()` methods for `"matrix"`, `"array"`, and `"ts"` have been fixed to call `validObject()`. (PR#14284)
- `R CMD INSTALL` now behaves the same way with or without '`--no-multiarch`' on platforms with only one installed architecture. (It used to clean the '`src`' directory without '`--no-multiarch`'.)
- `[<-.data.frame` was not quite careful enough in assigning (and potentially deleting) columns right-to-left. (PR#14263)
- `rbeta(n, a, b)` no longer occasionally returns `NaN` for `a >> 1 > b`. (PR#14291)
- `pnorm(x, log.p = TRUE)` could return `NaN` not `-Inf` for `x` near (minus for `lower.tail=TRUE`) the largest representable number.
- Compressed data files '`*.(txt|tab|csv).(gz|bz2|xz)`' were not recognized for the list of data topics and hence for packages using `LazyData`. (PR#14273)
- `textConnection()` did an unnecessary translation on strings in a foreign encoding (e.g., UTF-8 strings on Windows) and so was slower than it could have been on very long input strings. (PR#14286)
- `tools::Rd2txt()` did not render poorly written Rd files consistently with other renderers.
  It computed widths of strings that would be `print()`ed with escapes incorrectly, for example in the computation of column width for '`\tabular`'.
- `na.action()` did not extract the `na.action` component as documented.
- `do.call()`ing `NextMethod` in erroneous ways no longer segfaults. (PR#13487)

CHANGES IN R VERSION 2.11.0

SIGNIFICANT USER-VISIBLE CHANGES:

- Packages must have been installed under R >= 2.10.0, as the current help system is the only one now supported.
- A port to 64-bit Windows is now available as well as binary package repositories: see the 'R Administration and Installation Manual'.
- Argument matching for primitive functions is now done in the same way as for interpreted functions except for the deliberate exceptions

  ```
  call switch .C .Fortran .Call .External
  ```

  all of which use positional matching for their first argument, and also some internal-use-only primitives.
- The default device for command-line R at the console on Mac OS X is now `quartz()` and not `X11()`.

NEW FEATURES:

- The `open` modes for connections are now interpreted more consistently. `open = "r"` is now equivalent to `open = "rt"` for all connections. The default `open = ""` now means `"rt"` for all connections except the compressed-file connections `gzfile()`, `bzfile()` and `xzfile()` for which it means `"rb"`.
- `R CMD INSTALL` now uses the internal `untar()` function in package **utils**: this ensures that all platforms can install `bzip2`- and `xz`-compressed tarballs. In case this causes problems (as it has on some Windows file systems when run from Cygwin tools) it can be overridden by the environment variable `R_INSTALL_TAR`: setting this to a modern external tar program will speed up unpacking of large (tens of Mb or more) tarballs.
- `help(try.all.packages = TRUE)` is much faster (although the time taken by the OS to find all the packages the first time it is used can dominate the time).
- `R CMD check` has a new option '`--timings`' to record per-example timings in file '`<pkg>.Rcheck/<pkg>-Ex.timings`'.
- The TRE library has been updated to version 0.8.0 (minor bugfixes).
- `grep[l]`, `[g]sub` and `[g]regexpr` now work in bytes in an 8-bit locales if there is no marked UTF-8 input string: this will be somewhat faster, and for `[g]sub()` give the result in the native encoding rather than in UTF-8 (which returns to the behaviour prior to R 2.10.0).
- A new argument `skipCalls` has been added to `browser()` so that it can report the original context when called by other debugging functions.
- More validity checking of UTF-8 and MBCS strings is done by `agrep()` and the regular-expression matching functions.
- The undocumented restriction on `gregexpr()` to `length(text) > 0` has been removed.
- Package **tcltk** now sends strings to Tcl in UTF-8: this means that strings with a marked UTF-8 encoding are supported in non-UTF-8 locales.
- The graphics engine now supports rendering of raster (bitmap) images, though not all graphics devices can provide (full) support. Packages providing graphics devices (e.g., `Cairo`, `RSvgDevice`, `cairoDevice`) will need to be reinstalled.
  There is also support in the graphics engine for capturing raster images from graphics devices (again not supported on all graphics devices).

- `R CMD check` now also checks if the package and namespace can be unloaded: this provides a check of the `.Last.lib()` and `.onUnload()` hook functions (unless '`--install=fake`').
- `prop.table(x)` now accepts a one-dimensional table for `x`.
- A new function `vapply()` has been added, based on a suggestion from Bill Dunlap. It requires that a template for the function value be specified, and uses it to determine the output type and to check for consistency in the function values.
- The main HTML help page now links to a reformatted copy of this '`NEWS`' file. (Suggested by Henrik Bengtsson.) Package index files link to the package '`DESCRIPTION`' and '`NEWS`' files and a list of demos when using dynamic help.
- The `[` method for class `"AsIs"` allows the next method to change the underlying class. (Wish of Jens Oehlschlägel.)
- `write.csv[2]` no longer allow argument `append` to be changed: as ever, direct calls to `write.table()` give more flexibility as well as more room for error.
- The index page for HTML help for a package now collapses multiple signatures for S4 methods into a single entry.
- The use of `.required` by `require()` and `detach()` has been replaced by `.Depends` which is set from the `Depends` field of a package (even in packages with namespaces). By default `detach()` prevents such dependencies from being detached: this can be overridden by the argument `force`.
- `bquote()` has been extended to work on function definitions. (Wish of PR#14031).
- `detach()` when applied to an object other than a package returns the environment that has been detached, to parallel `attach()`.
- `readline()` in non-interactive use returns `""` and does not attempt to read from the 'terminal'.
- New function `file_ext()` in package **tools**.
- `xtfrm()` is now primitive and internally generic, as this allows S4 methods to be set on it without name-space scoping issues.
  There are now `"AsIs"` and `"difftime"` methods, and the default method uses `unclass(x)` if `is.numeric(x)` is true (which will be faster but relies on `is.numeric()` having been set correctly for the class).
- `is.numeric(x)` is now false for a `"difftime"` object (multiplication and division make no sense for such objects).
- The default method of `weighted.mean(x, w)` coerces `w` to be numeric (aka double); previously only integer weights were coerced. Zero weights are handled specially so an infinite value with zero weight does not force an `NaN` result.
  There is now a `"difftime"` method.
- `bug.report()` now has arguments `package` and `lib.loc` to generate bug reports about packages. When this is used, it looks for a `BugReports` field in the package '`DESCRIPTION`' file, which will be assumed to be a URL at which to submit the report, and otherwise generates an email to the package maintainer. (Suggested by Barry Rowlingson.)
- `quantile()` now has a method for the date-time class `"POSIXt"`, and types 1 and 3 (which never interpolate) work for Dates and ordered factors.
- `length(<POSIXlt>)` now returns the length of the corresponding abstract timedate-vector rather than always 9 (the length of the underlying list structure). (Wish of PR#14073 and PR#10507.)
- The `readline` completion backend no longer sorts possible completions alphabetically (e.g., function argument names) if R was built with `readline` >= 6.

- `select.list()` gains a `graphics` argument to allow Windows/Mac users to choose the text interface. This changes the behaviour of `new.packages(ask=TRUE)` to be like `update.packages(ask=TRUE)` on those platforms in using a text menu: use ask=`"graphics"` for a graphical menu.
- New function `chooseBioCmirror()` to set the `"BioC_mirror"` option.
- The R grammar now prevents using the argument `name` in signatures of S4 methods for `$` and `$<-`, since they will always be called with a character string value for `name`. The implicit S4 generic functions have been changed to reflect this: packages which included `name` in the signature of their methods need to be updated and re-installed.
- The handling of the `method` argument of `glm()` has been refined following suggestions by Ioannis Kosmidis and Heather Turner.
- `str()` gains a new argument `list.len` with default 99, limiting the number of `list()` items (per level), thanks to suggestions from David Winsenius.
- Having formal arguments of an S4 method in a different order from the generic is now an error (the warning having been ignored by some package maintainers for a long time).
- New functions `enc2native()` and `enc2utf8()` convert character vectors with possibly marked encodings to the current locale and UTF-8 respectively.
- Unrecognized escapes and embedded nuls in character strings are now an error, not just a warning. Thus option `"warnEscapes"` is no longer needed. `rawToChar()` now removes trailing nuls silently, but other embedded nuls become errors.
- Informational messages about masked objects displayed when a package is attached are now more compact, using `strwrap()` instead of one object per line.
- `print.rle()` gains argument `prefix`.
- `download.file()` gains a `"curl"` method, mainly for use on platforms which have `curl` but not `wget`, but also for some hard-to-access URLs.
- In `Rd`, '`\eqn`' and '`\deqn`' will render in HTML (and convert to text) upper- and lower-case Greek letters (entered as '`\alpha`' ...), '`\ldots`', '`\dots`', '`\ge`' and '`\le`'.
- `utf8ToInt()` and `intToUtf8()` now map `NA` inputs to `NA` outputs.
- `file()` has a new argument `raw` which may help if it is used with something other than a regular file, e.g. a character device.
- New function `strtoi()`, a wrapper for the C function `strtol`.
- `as.octmode()` and `as.hexmode()` now allow inputs of length other than one.
  The `format()` and `print()` methods for `"octmode"` now preserve names and dimensions (as those for `"hexmode"` did).
  The `format()` methods for classes `"octmode"` and `"hexmode"` gain a `width` argument.
- `seq.int()` returns an integer result in some further cases where `seq()` does, e.g. `seq.int(1L, 9L, by = 2L)`.
- Added '`\subsection{}{}`' macro to Rd syntax, for subsections within sections.
- n-dimensional arrays with dimension names can now be indexed by an n-column character matrix. The indices are matched against the dimension names. `NA` indices are propagated to the result. Unmatched values and `""` are not allowed and result in an error.
- `interaction(drop=TRUE)` uses less memory (related to PR#14121).
- `summary()` methods have been added to the `"srcref"` and `"srcfile"` classes, and various encoding issues have been cleaned up.
- If option `"checkPackageLicense"` is set to `TRUE` (not currently the default), users will be asked to agree to non-known-to-be-FOSS package licences at first use.
- Checking `setAs(a, b)` methods only gives a message instead of a warning, when one of `a` or `b` is unknown.

- New function `norm()` to compute a matrix norm. `norm()` and also `backsolve()` and `sample()` have implicit S4 generics.
- Files '`Renviron.site`' and '`Rprofile.site`' can have architecture-specific versions on systems with sub-architectures.
- `R CMD check` now (by default) also checks Rd files for auto-generated content in need of editing, and missing argument descriptions.
- `aggregate()` gains a formula method thanks to a contribution by Arni Magnusson. The data frame method now allows summary functions to return arbitrarily many values.
- `path.expand()` now propagates `NA` values rather than converting them to `"NA"`.
- `file.show()` now disallows `NA` values for file names, headers, and pager.
- The 'fuzz' used by `seq()` and `seq.int()` has been reduced from `1e-7` to `1e-10`, which should be ample for the double-precision calculations used in R. It ensures that the fuzz never comes into play with sequences of integers (wish of PR#14169).
- The default value of `RSiteSearch(restrict=)` has been changed to include vignettes but to exclude R-help. The R-help archives available have been split, with a new option of `"Rhelp10"` for those from 2010.
- New function `rasterImage()` in the `graphics` package for drawing raster images.
- `stats:::extractAIC.coxph()` now omits aliased terms when computing the degrees of freedom (suggestion of Terry Therneau).
- `cor()` and `cov()` now test for misuse with non-numeric arguments, such as the non-bug report PR#14207.
- `pchisq(ncp =, log.p = TRUE)` is more accurate for probabilities near one. E.g., `pchisq(80, 4, ncp=1, log.p=TRUE)`. (Maybe what was meant in PR#14216.)
- `maintainer()` has been added, to give convenient access to the name of the maintainer of a package (contributed by David Scott).
- `sample()` and `sample.int()` allow zero items to be sampled from a zero-length input. `sample.int()` gains a default value `size=n` to be more similar to `sample()`.
- `switch()` returned `NULL` on error (not previously documented on the help page): it now does so invisibly, analogously to if-without-else.
  It is now primitive: this means that argument `EXPR` is always matched to the first argument and there is no danger of partial matching to later named arguments.
- Primitive functions `UseMethod()`, `attr()`, `attr<-()`, `on.exit()`, `retracemem()` and `substitute()` now use standard argument matching (rather than positional matching). This means that all multi-argument primitives which are not internal now use standard argument matching except where positional matching is desirable (as for `switch()`, `call()`, `.C()` ...).
- All the one-argument primitives now check that any name supplied for their first argument is a partial match to the argument name as documented on the help page: this also applies to replacement functions of two arguments.
- `base::which()` uses a new `.Internal` function when `arr.ind` is `FALSE` resulting in a 10x speedup. Thanks to Patrick Aboyoun for implementation suggestions.
- Help conversion to text now uses the first part of '`\enc{}{}`' markup if it is representable in the current output encoding. On the other hand, conversion to LaTeX with the default `outputEncoding = "ASCII"` uses the second part.
- A new class `"listOfMethods"` has been introduced to represent the methods in a methods table, to replace the deprecated class `"MethodsList"`.
- `any()` and `all()` return early if possible. This may speed up operations on long vectors.

- `strptime()` now accepts `"%z"` (for the offset from UTC in the RFC822 format of `+/-hhmm`).
- The PCRE library has been updated to version 8.02, a bug-fix release which also updates tables to Unicode 5.02.
- Functions which may use a graphical `select.list()` (including `menu()` and `install.packages()`) now check on a Unix-alike that Tk can be started (and not just `capabilities("tcltk") && capabilities("X11")`).
- The parser no longer marks strings containing octal or hex escapes as being in UTF-8 when entered in a UTF-8 locale.
- On platforms with cairo but not Pango (notably Mac OS X) the initial default `X11()` type is set to `"Xlib"`: this avoids several problems with font selection when done by cairo rather than Pango (at least on Mac OS X).
- New function `arrayInd()` such that `which(x, arr.ind = TRUE)` for an array 'x' is now equivalent to `arrayInd(which(x), dim(x), dimnames(x))`.

DEPRECATED & DEFUNCT:

- Bundles of packages are defunct.
- `stats::clearNames()` is defunct: use `unname()`.
- Basic regular expressions are defunct, and `strsplit()`, `grep()`, `grepl()`, `sub()`, `gsub()`, `regexpr()` and `gregexpr()` no longer have an `extended` argument.
- `methods::trySilent()` is defunct.
- `index.search()` (which was deprecated in 2.10.0) is no longer exported and has a different argument list.
- Use of multiple arguments to `return()` is now defunct.
- The use of `UseMethod()` with more than two arguments is now defunct.
- In the **methods** package, the `"MethodsList"` metadata objects which had been superseded by hash tables (environments) since R 2.8.0 are being phased out. Objects of this class are no longer assigned or used as metadata by the package.
  `getMethods()` is now deprecated, with its internal use replaced by `findMethods()` and other changes. Creating objects from the `"MethodsList"` class is also deprecated.
- Parsing strings containing both octal/hex and Unicode escapes now gives a warning and will become an error in R 2.12.0.

INSTALLATION:

- UTF-8 is now used for the reference manual and package manuals. This requires LaTeX '2005/12/01' or later.
- `configure` looks for a POSIX compliant `tr`, Solaris's `/usr/ucb/tr` having been found to cause `Rdiff` to malfunction.
- `configure` is now generated with `autoconf 2.65`, which works better on recent systems and on Mac OS X.

PACKAGE INSTALLATION:

- Characters in R source which are not translatable to the current locale are now handled more tolerantly: these will be converted to hex codes with a warning. Such characters are only really portable if they appear in comments.
- `R CMD INSTALL` now tests that the installed package can be loaded (and backs out the installation if it cannot): this can be suppressed by '`--no-test-load`'. This avoids installing/updating a package that cannot be used: common causes of failures to load are missing/incompatible external software and missing/broken dependent packages.

- Package installation on Windows for a package with a '`src`' directory now checks if a DLL is created unless there is a '`src/Makefile.win`' file: this helps catch broken installations where the toolchain has not reported problems in building the DLL. (Note: this can be any DLL, not just one named '`<pkg-name>.dll`'.)

BUG FIXES:

- Using `with()`, `eval()` etc with a list with some unnamed elements now works. (PR#14035)
- The `"quick"` dispatch of S4 methods for primitive functions was not happening, forcing a search each time. (Dispatch for closures was not affected.) A side effect is that default values for arguments in a method that do not have defaults in the generic will now be ignored.
- Trying to dispatch S4 methods for primitives during the search for inherited methods slows that search down and potentially could cause an infinite recursion. An internal switch was added to turn off all such methods from `findInheritedMethods()`.
- R framework installation (on Mac OS X) would not work properly if a rogue `Resources` directory was present at the top level. Such a non-symlink will now be renamed to `Resources.old` (and anything previously named `Resources.old` removed) as part of the framework installation process.
- The checks for conforming S4 method arguments could fail when the signature of the generic function omitted some of the formal arguments (in addition to `...`). Arguments omitted from the method definition but conforming (per the documentation) should now be ignored (treated as `"ANY"`) in dispatching.
- The computations for S4 method evaluation when `...` was in the signature could fail, treating `...` as an ordinary symbol. This has been fixed, for the known cases.
- Various `ar()` fitting methods have more protection for singular fits.
- `callNextMethod` now works again with the `drop=` argument in '`[`'
- `parse()` and `parse_Rd()` miscounted columns when multibyte UTF-8 characters were present.
- Formatting of help pages has had minor improvements: extra blank lines have been removed from the text format, and empty package labels removed from HTML.
- `cor(A, B)` where `A` is $n \times 1$ and `B` a 1-dimensional array segfaulted or gave an internal error. (The case `cor(B, A)` was PR#7116.)
- `cut.POSIXt()` applied to a start value after the DST transition on a DST-change day could give the wrong time for argument `breaks` in units of days or longer. (PR#14208)
- `do_par()` `UNPROTECT`ed too early (PR#14214)
- Subassignment `x[[....]] <- y` didn't check for a zero-length right hand side, and inserted a rubbish value. (PR#14217)
- `fisher.test()` no longer gives a P-value **very** slightly > 1, in some borderline cases.
- Internal function `matchArgs()` no longer modifies the general purpose bits of the `SEXP`s that make up the formals list of R functions. This fixes an invalid error message that would occur when a garbage collection triggered a second call to `matchArgs` for the same function *via* a finalizer.
- `gsub()` in 2.10.x could fail from stack overflow for extremely long strings due to temporary data being allocated on the stack. Also, `gsub()` with `fixed=TRUE` is in some circumstances considerably faster.
- Several primitives, including `attributes()`, `attr<-()` `interactive()`, `nargs()` and `proc.time()`, did not check that they were called with the correct number of arguments.

- A potential race condition in `list.files()` when other processes are operating on the directory has been fixed; the code now dynamically allocates memory for file listings in a single pass instead of making an initial count pass.
- `mean(x, trim=, na.rm = FALSE)` failed to return `NA` if `x` contained missing values. (Reported by Bill Dunlap.)
- Extreme tail behavior of, `pbeta()` {and hence `pf()`}, e.g., `pbeta(x, 3, 2200, lower.tail=FALSE, log.p=TRUE)` now returns finite values instead of jumping to `-Inf` too early. (PR#14230).
- `parse(text=x)` misbehaved for objects `x` that were not coerced internally to character, notably symbols. (Reported to R-devel by Bill Dunlap.)
- The internal C function `coerceSymbol` now handles coercion to character, and warns if coercion fails (rather than silently returning `NULL`). This allows a name to be given where a character vector is required in functions which coerce internally.
- The interpretation by `strptime()` of `"%c"` was non-standard (not that it is ever advisable to use locale- and system-specific input formats).
- capabilities(`"X11"`) now works the same way on Mac OS X as on other platforms (and as documented: it was always true for R built with '`--with-aqua`', as the CRAN builds are).
- The `X11()` device with cairo but not Pango (notably Mac OS X) now checks validity of text strings in UTF-8 locales (since Pango does but cairo it seems does not).
- `read.fwf()` misread multi-line records when n was specified. (PR#14241)
- `all.equal(tolerance = e)` passes the numeric tolerance also to the comparison of the attributes.
- `pgamma(0, 0)`, a boundary case, now returns 0, its limit from the left, rather than the limit from the right.
- Issuing `POST` requests to the internal web server could stall the request under certain circumstances.
- `gzcon( <textConnection> )`, an error, no longer damages the connection (in a way to have it segfault). (PR#14237)
- All the results from `hist()` now use the nominal `breaks` not those adjusted by the numeric 'fuzz': in recent versions the nominal `breaks` were reported but the 'density' referred to the intervals used in the calculation – which mattered very slightly for one of the extreme bins. (Based on a report by Martin Becker.)
- If `xy[z].coords` (used internally by many graphics functions) are given a list as `x`, they now check that the list has suitable names and give a more informative error message. (PR#13936)

CHANGES IN R VERSION 2.10.1 patched

NEW FEATURES:

- The handling of line textures in the `postscript()` and `pdf()` devices was set up for round end caps (the only type which existed at the time): it has now been adjusted for butt endcaps.
- `lchoose(a, k)` is now defined as `log(abs(choose(a,k)))`, analogously to `lfactorial()`.
- Although `\eqn{}` in Rd files is defined as a 'verbatim' macro, many packages expected `\dots` and `\ldots` to be interpreted there (as was the case in R < 2.10.0), so this is now done (using an ellipsis in HTML rendering).

- Escaping of braces in quoted strings in R-code sections of Rd files is allowed again. This had been changed for the new Rd format in R 2.10.0 but was only documented on the developer site and was handled inconsistently by the converters: text and example conversion removed the escapes but HTML conversion did not.
- The PCRE library has been updated to version 8.01, a bug-fix release.
- `tools::readNEWS()` now accepts a digit as the first character of a news section.

BUG FIXES:

- Using `read.table(header=TRUE)` on a header with an embedded new line would copy part of the header into the data. (PR#14103)
- `qpois(p = 1, lambda = 0)` now gives 0 as for all other `p`. (PR#14135)
- Functions related to string comparison (e.g., `unique()`, `match()`) could cause crashes when used with strings not in the native encoding, e.g., UTF-8 strings on Windows. (PR#14114 and PR#14125)
- `x[ , drop=TRUE]` dropped an `NA` level even if it was in use.
- The dynamic HTML help system reported the wrong MIME type for the style sheet.
- `tools::codoc()` (used by `R CMD check`) was missing cases where the function had no arguments but was documented to have some.
- Help links containing special characters (e.g., `"?"`) were not generated correctly when rendered in HTML. (PR#14155)
- `lchoose(a, k)` no longer wrongly gives `NaN` for negative `a`.
- `ks.test()` could give a p-value that was off by one observation due to rounding error. (PR#14145)
- `readBin()`/`readChar()` when reading millions of character strings in a single call used excessive amounts of memory (which also slowed them down).
- `R CMD SHLIB` could fail if used with paths that were not alphanumeric, e.g. contained `+`. (PR#14168)
- `sprintf()` was not re-entrant, which potentially caused problems if an `as.character()` method called it.
- The `quartz()` device did not restore the clipping region when filling the background for a new page. This could be observed in multi-page bitmap output as stale outer regions of the plot.
- `p.adjust(method, n)` now works correctly for the rare case `n > length(p)`, also when method differs from `"bonferroni"` or `"none"`, thanks to a patch from Gordon Smyth.
- `tools::showNonASCII()` failed to detect non-ASCII characters if `iconv()` (incorrectly) converted them to different ASCII characters. (Seen on Windows only.)
- `tcrossprod()` wrongly failed in some cases when one of the arguments was a vector and the other a matrix.
- `[cr]bind(..., deparse.level=2)` was not always giving names when documented to do so. (Discovered whilst investigating PR#14189.)
- `match(incomparables=<non-NULL>)` could in rare cases infinite-loop.
- `poisson.test()` needed to pass argument `conf.level` to `binom.test()`. (PR#14195)
- The `"nls"` method for `df.residual()` gave incorrect results for models fitted with `na.action = na.exclude`. (PR#14194)
- A change to `options(scipen=)` was only implemented when printing next occurred, even though it should have affected intervening calls to `axis()`, `contour()` and `filledcontour()`.

- `prettyNum(drop0trailing=TRUE)` did not handle signs of imaginary parts of complex numbers correctly (and this was used by `str()`: PR#14201).
- `system.time()` had the `sys.child` component wrong (copied `user.child` instead) on systems with `HAVE_GETRUSAGE`. (PR#14210)
- Changing both line texture and line cap (end) resulted in the latter to be omitted form the PDF code. In addition, line cap (end) and join are now set explicitly in PDF output to ensure correct defaults.
- The suppression of auto-rotation in `bitmap()` and `dev2bitmap()` with the `"pdfwrite"` device was not working correctly.
- `plot(ecdf(), log="x")` no longer gives an incorrect warning.
- `read.fwf()` works again when argument `file` is a connection.
- Startup files will now be found if their paths exceed 255 bytes. (PR#14228)
- `contrasts<-` (in the **stats** package) no longer has an undeclared dependence on **methods** (introduced in 2.10.0).

CHANGES IN R VERSION 2.10.1

NEW FEATURES:

- The PCRE library has been updated to version 8.00.
- `R CMD INSTALL` has new options '`--no-R`', '`--no-libs`', '`--no-data`', '`--no-help`', '`--no-demo`', '`--no-exec`', and '`--no-inst`' to suppress installation of the specified part of the package. These are intended for special purposes (e.g., building a database of help pages without fully installing all packages).
- The documented line-length limit of 4095 bytes when reading from the console now also applies also to `parse(file="")` (which previously had a limit of around 1024 bytes).
- A Bioconductor mirror can be set for use by `setRepositories()` *via* the option `"BioC_mirror"`, e.g. the European mirror can be selected by `options(BioC_mirror="http://bioconductor.statistik.tu-dortmund.de")`.
- Double-clicking in a `tk_select.list()` list box now selects the item and closes the list box (as happens on the Windows `select.list()` widget).

INSTALLATION:

- `configure` will be able to find a usable `libtiff` in some rare circumstances where it did not previously (where `libtiff` needed to be linked explicitly against `-ljpeg`).
- Making `refman.pdf` works around a problem with the indexing with `hyperref 6.79d` and later.

DEPRECATED & DEFUNCT:

- The `extended` argument is deprecated in `strsplit()`, `grep()`, `grepl()`, `sub()`, `gsub()`, `regexpr()` and `gregexpr()` (not just the value `extended = FALSE`) and will be removed in R 2.11.0.

BUG FIXES:

- `trigamma(x)` and other `psigamma(x, n)` calls are now accurate for very large `abs(x)`. (PR#14020)
- `[g]sub(perl=FALSE, fixed=FALSE)` could use excessive stack space when used with a very long vector containing some non-ASCII strings.

- The default method of `weighted.mean(na.rm = TRUE)` did not omit weights for `NA` observations in 2.10.0. (PR#14032)
- `[g]regexpr(pattern, fixed = TRUE)` returned match positions in bytes (not characters) in an MBCS locale if `pattern` was a single byte.
  `[g]sub(fixed = TRUE)` with a single-byte pattern could conceivably have matched part of a multibyte character in a non-UTF-8 MBCS.
- `findLineNum()` and `setBreakpoint()` would sometimes fail if the specified file was not in the current directory.
- Package **tcltk**'s `demo(tkdensity)` was broken in 2.9.0 when `demo()` was changed to set `par(ask = TRUE)`.
- `gsub()` with backrefs could fail on extremely long strings (hundreds of thousands of characters) due to integer overflow in a length calculation.
- `abline(untf=TRUE)` now uses a better x-grid in log-scale, e.g., for `plot(c(1,300), c(1,300), log="xy"); abline(4,1, untf=TRUE)`.
- `detach()`/`unloadNamespace()` arrange to flush the package's lazyload cache of R objects once the package/namespace is no longer needed.
- There have been small fixes to the rendering of help, e.g. `\command` is now rendered verbatim (so e.g. `--` is not interpreted, PR#14045).
  Also, there are many small changes to help files where the new converters were not rendering them in the same way as before.
- `available.packages()` would fail when run on a repository with no packages meeting the filtering conditions. (PR#14042)
- `rep(x, times, each = 2)` gave invalid results when the `times` argument was a vector longer than `x`. Reported by Bill Dunlap.
- An error when `unloadNamespace()` attempted to run the `.onUnload()` function gave an error in the reporting function and so was not reported properly.
- Text help rendering did not handle very long input lines properly.
- `promptMethods()` generated signature documentation improperly.
- `pgamma(x, a, lower.tail=FALSE)` and `qgamma(...)` are now considerably more accurate in some regions for very small `a`. `qgamma()` now correctly returns `0` instead of `NaN` in similar extreme cases, and `qgamma()` no longer warns in the case of small `a`, see (PR#12324).
- `unname()` now also removes names from a zero length vector.
- Printing results from `ls.str()` no longer evaluates unevaluated calls.
- `complete.cases()` failed on a 0-column data frame argument. (Underlies PR#14066.)
  It could return nonsensical results if no input determined the number of cases (seen in the no-segfault tests).
- An error in `nls()` with a long formula could cause a segfault. (PR#14059)
- `qchisq(p, df, ncp, lower.tail = FALSE)` with `ncp >= 80` was inaccurate for small `p` (as the help page said): it is now less inaccurate. (In part, PR#13999.)
  For `ncp` less than but close to 80, `pchisq()` and `qchisq()` are more accurate for probabilities very close to 1 (a series expansion was truncated slightly too early).
  `pchisq(x, df, ncp)` can no longer return values just larger than one for large values of `ncp`.
- `intToUtf8()` could fail when asked to produce 10Mb or more strings, something it was never intended to do: unfortunately Windows crashed R (other OSes reported a lack of resources). (PR#14068)
- `chisq.test()` could fail when given argument `x` or `y` which deparsed to more than one line. (Reported by Laurent Gauthier.)

- S4 methods are uncached whenever the namespace containing them is unloaded (by `unloadNamespace()` as well as by `detach(unload = TRUE)`).
- The internal record-keeping by `dyn.load`/`dyn.unload` was incomplete, which could crash R if a DLL that registered `.External` routines had earlier been unloaded.
- `bessel[JY](x, nu)` with `nu` a negative integer (a singular case) is now correct, analogously to `besselI()`, see PR#13556.
- `tools::file_path_as_absolute()` doubled the file separator when applied to a file such as '`"/vmunix"`' or (on Windows) '`"d:/afile"`' in a directory for which `getwd()` would return a path with a trailing separator (largely cosmetic, as reasonable file systems handle such a path correctly). (Perhaps what was meant by PR#14078.)
- `unsplit(drop = TRUE)` applied to a data frame failed to pass `drop` to the computation of row names. (PR#14084)
- The `"difftime"` method of `mean()` ignored its `na.rm` argument.
- `tcltk::tk_select.list()` is now more likely to remove the widget immediately after selection is complete.
- Adding/subtracting a `"difftime"` object to/from a `"POSIXt"` or `"Date"` object works again (it was broken by the addition of `Ops.difftime`).
- Conversion to latex of an Rd file with no aliases failed.
- `wilcox.test(conf.int=TRUE)` has achieved.level corrected and, for `exact=FALSE`, now returns a `estimate` component which does not depend on the alternative used.
- `help.search()` failed when the package argument was specified. (PR#14113)
- `switch(EXPR = "A")` now returns `NULL`, as does `switch(1)` (which used to signal an error).

CHANGES IN R VERSION 2.10.0

SIGNIFICANT USER-VISIBLE CHANGES:

- Package help is now converted from `Rd` by the R-based converters that were first introduced in 2.9.0. This means
  - Packages that were installed by R-devel after 2009-08-09 should not be used with earlier versions of R, and most aspects of package help (including the runnable examples) will be missing if they are so used.
  - Text, HTML and latex help and examples for packages installed under the new system are converted on-demand from stored parsed Rd files. (Conversions stored in packages installed under R $<$ 2.10.0 are used if no parsed Rd files are found. It is recommended that such packages be re-installed.)
- HTML help is now generated dynamically using an HTTP server running in the R process and listening on the loopback interface.
  - Those worried about security implications of such a server can disable it by setting the environment variable `R_DISABLE_HTTPD` to a non-empty value. This disables `help.start()` and HTML help (so text help is shown instead).
  - The Java/Javascript search engine has been replaced by an HTML interface to `help.search()`. `help.start()` no longer has an argument `searchEngine` as it is no longer needed.
  - The HTML help can now locate cross-references of the form `\link[pkg]{foo}` and `\link[pkg:foo]{bar}` where `foo` is an alias in the package, rather than the documented (basename of a) filename (since the documentation has been much ignored).

NEW FEATURES:

- `polygon()`, `pdf()` and `postscript()` now have an argument `fillOddEven` (default `FALSE`), which controls the mode used for polygon fills of self-intersecting shapes.
- New `debugonce()` function; further, `getOption("deparse.max.lines")` is now observed when debugging, from a code suggestion by John Brzustowski. (PR#13647/8)
- `plot()` methods for `"stepfun"` and hence `"ecdf"` no longer plot points by default for `n >= 1000`.
- `[g]sub(perl=TRUE)` now also supports `"\E"` in order to **end** `"\U"` and `"\L"` case changes, thanks to a patch from Bill Dunlap.
- `factor()`, `levels()<-`, etc, now ensure that the resulting factor levels are unique (as was always the implied intention). Factors with duplicated levels are still constructible by low-level means, but are now declared illegal.
- New `print()` (S3) method for class `"function"`, also used for auto-printing. Further, `.Primitive` functions now print and auto-print identically. The new method is based on code suggestions by Romain François.
- The `print()` and `toLatex()` methods for class `"sessionInfo"` now show the locale in a nicer format and have arguments to suppress locale information.
- In addition to previously only `round()`, there are other `Math` group (S3) methods for `"difftime"`, such as `floor()`, `signif()`, `abs()`, etc.
- For completeness, `old.packages()` and `available.packages()` allow arguments `type` to be specified (you could always specify arguments `available` or `contriburl`).
- `available.packages()` by default only returns information on the latest versions of packages whose version requirements are satisfied by the currently running R.
- `tools::write_PACKAGES()` has a new argument `latestOnly`, which defaults to `TRUE` when only the latest versions in the repository will be listed in the index.
- `getOption()` has a new argument `default` that is returned if the specified option is not set. This simplifies querying a value and checking whether it is `NULL` or not.
- `parse()` now warns if the requested encoding is not supported.
- The `"table"` method of `as.data.frame()` gains a `stringsAsFactors` argument to allow the classifying factors to be returned as character vectors rather than the default factor type.
- If `model.frame.default()` encounters a character variable where `xlev` indicates a factor, it now converts the variable to a factor (with a warning).
- `curve()` now returns a list containing the points that w§ere drawn.
- `spineplot()` now accepts `axes = FALSE`, for consistency with other functions called by `plot.factor()`.
- The Kendall and Spearman methods of `cor.test()` can optionally use continuity correction when not computing exact p-values. (The Kendall case is the wish of PR#13691.)
- R now keeps track of line numbers during execution for code sourced with `options(keep.source = TRUE)`. The source reference is displayed by debugging functions such as `traceback()`, `browser()`, `recover()`, and `dump.frames()`, and is stored as an attribute on each element returned by `sys.calls()`.
- More functions now have an implicit (S4) generic definition.
- `quantile.default()` now disallows factors (wish of PR#13631) and its help documents what numeric-like properties its input need to have to work correctly.
- `weighted.mean()` is now generic and has `"Date"`, `"POSIXct"` and `"POSIXlt"` methods.

- Naming subscripts (e.g., `x[i=1, j=2]`) in `data.frame` methods for `[` and `[[` now gives a warning. (Names are ignored in the default method, but could have odd semantics for other methods, and do for the data.frame ones.)
- `as.data.frame()` has an `"aovproj"` method. (Wish of PR#13505)
- `as.character(x)` for numeric `x` no longer produces strings such as `"0.30"`, i.e., with trailing zeros. This change also renders levels construction in `factor()` more consistent.
- `codocClasses()`, which checks consistency of the documentation of S4 class slots, now does so in considerably more cases. The documentation of inherited slots (from superclasses) is now optional. This affects `R CMD check <pkg>` when the package defines S4 classes.
- `codoc()` now also checks S4 methods for code/documentation mismatches.
- `for()`, `while()`, and `repeat()` loops now always return NULL as their (invisible) value. This change was needed to address a reference counting bug without creating performance penalties for some common use cases.
- The `print()` method for `ls.str()` results now obeys an optional `digits` argument.
- The `method` argument of `glm()` now allows user-contributed methods.
- More general `reorder.default()` replaces functionality of `reorder.factor()` and `reorder.character()`.
- The function `aspell()` has been added to provide an interface to the `Aspell` spell-checker.
- Filters `RdTextFilter()` and `SweaveTeXFilter()` have been added to the tools package to provide support for `aspell()` or other spell checkers.
- `xtabs()` with the new argument `sparse = TRUE` now returns a sparse Matrix, using package **Matrix**.
- `contr.sum()` etc gain an argument `sparse` which allows sparse matrices to be returned.
  `contrasts()` also gains a `sparse` argument which it passes to the actual contrast function if that has a formal argument `sparse`.
  `contrasts(f, .) <- val` now also works when `val` is a sparse Matrix. It is planned that `model.matrix()` will work with such factors `f` in the future.
- `readNEWS()` will recognize a UTF-8 byte-order mark (BOM) in the '`NEWS`' file. However, it is safer to use only ASCII code there because not all editors recognize BOMs.
- New utility function `inheritedSlotNames()` for S4 class programming.
- `tabulate()` now allows NAs to pass through (and be ignored).
- If `debug()` is called on an S3 generic function then all methods are debugged as well.
- Outlier symbols drawn by `boxplot()` now obey the `outlwd` argument. Reported by Jurgen Kluge.
- `svd(x)` and `eigen(x)` now behave analogously to `qr(x)` in accepting logical matrices `x`.
- File '`NEWS`' is now in UTF-8, and has a BOM (often invisible) on the first line, and `Emacs` local variables set for UTF-8 at the end. `RShowDoc("NEWS")` should display this correctly, given suitable fonts.
- `terms.formula(simplify = TRUE)` now does not deparse the LHS and so preserves non-standard responses such as `` `a: b` `` (requested by Sundar Dorai-Raj).
- New function `news()` for building and querying R or package news information.
- `z^n` for integer `n` and complex `z` is more accurate now if `|n| <= 65536`.
- `factor(NULL)` now returns the same as `factor(character(0))` instead of an error, and `table(NULL)` consequently does analogously.

- `as.data.frame.vector()` (and its copies) is slightly faster by avoiding a copy if there are no names (following a suggestion of Tim Hesterberg).
- `writeLines()`, `writeBin()` and `writeChar()` have a new argument `useBytes`. If false, character strings with marked encodings are translated to the current locale (as before) but if true they are written byte-by-byte.
- `iconv()` has a new argument `mark` which can be used (by experts) to suppress the declaration of encodings.
- '`DESCRIPTION`' file's `LinkingTo` specs are now recognized as installation dependencies, and included in package management computations.
- Standardized '`DESCRIPTION`' file `License` specs are now available for package management computations.
- `"\uxxxx"` and `"\Uxxxxxxxx"` escapes can now be parsed to a UTF-8 encoded string even in non-UTF-8 locales (this has been implemented on Windows since R 2.7.0). The semantics have been changed slightly: a string containing such escapes is always stored in UTF-8 (and hence is suitable for portably including Unicode text in packages).
- New `as.raw()` method for `"tclObj"` objects (wish of PR#13758).
- `Rd.sty` now makes a better job of setting email addresses, including using a monospaced font.
- `textConnection()` gains an `encoding` argument to determine how input strings with marked encodings will be handled.
- `R CMD Rd2pdf` is available as a shortcut for `R CMD Rd2dvi --pdf`.
- `R CMD check` now checks links where a package is specified (`\link[pkg]{file}` or `\link[pkg:file]{topic}`), if the package is available. It notes if the package is not available, as in many cases this is an error in the link.
- `identical()` gains three logical arguments, which allow for even more differentiation, notably `-0` and `0`.
- `legend()` now can specify the `border` color of filled boxes, thanks to a patch from Frederic Schutz.
- Indexing with a vector index to `[[ ]]` has now been extended to all recursive types.
- Pairlists may now be assigned as elements of lists. (Lists could always be created with pairlist elements, but `[[<-` didn't support assigning them.)
- The parser now supports C-preprocessor-like `#line` directives, so error messages and source references may refer to the original file rather than an intermediate one.
- New functions `findLineNum()` and `setBreakpoint()` work with the source references to find the location of source lines and set breakpoints (using `trace()`) at those lines.
- Namespace importing is more careful about warning on masked generics, thanks to a patch by Yohan Chalabi.
- `detach()` now has an argument `character.only` with the same meaning as for `library()` or `require()`.
- `available.packages()` gains a `filters` argument for specifying the filtering operations performed on the packages found in the repositories. A new built-in `"license/FOSS"` filter only retains packages for which installation can proceed solely based on packages which can be verified as Free or Open Source Software (FOSS) employing the available license specifications.
- In registering an S3 class by a call to `setOldClass()`, the data part (e.g., the object type) required for the class can be included as one of the superclasses in the Classes argument.

- The argument `f` to `showMethods()` can be an expression evaluating to a generic function, allowing methods to be shown for non-exported generics and other nonstandard cases.
- `sprintf()` now supports `%o` for octal conversions.
- New function `Sys.readlink()` for information about symbolic links, including if a file is a symbolic link.
- Package **tools** has new functions `checkRdaFiles()` and `resaveRdaFiles()` to report on the format of '`.rda`'/'`.RData`' data files, and to re-save them in a different compressed format, including choosing the most compact format available.
  A new `INSTALL` option, '`--resave-data`', makes use of this.
- File '`~/.R/config`' is used in preference to '`~/.Rconfig`', and these are now documented in 'R Installation and Administration'.
- Logic operations with complex numbers now work, as they were always documented to, and as in S.
- `arrows()` and `segments()` allow one of `x1` or `y1` to be omitted to simplify the specification of vertical or horizontal lines (suggestion of Tim Hesterberg).
- `approxfun()` is faster by avoiding repeated `NA` checks (diagnosis and patch by Karline Soetaert & Thomas Petzoldt).
- There are the beginnings of a Nynorsk translation by Karl Ove Hufthammer.
- `stripchart()` allows `par bg` to be passed in for the background colour for `pch = 21` (wish of PR#13984).
- New generic function `.DollarNames()` to enable class authors to customize completion after the `$` extractor.
- `load()`, `save()`, `dput()` and `dump()` now open a not-yet-open connection in the appropriate mode (as other functions using connections directly already did).

REGULAR EXPRESSIONS:

- A different regular expression engine is used for basic and extended regexps and is also for approximate matching. This is based on the TRE library of Ville Laurikari, a modified copy of which is included in the R sources.
  This is often faster, especially in a MBCS locale.
  Some known differences are that it is less tolerant of invalid inputs in MBCS locales, and in its interpretation of undefined (extended) regexps such as `"^*"`. Also, the interpretation of ranges such as `[W-z]` in caseless matching is no longer to map the range to lower case.
  This engine may in future be used in 'literal' mode for `fixed = TRUE`, and there is a compile-time option in `src/main/grep.c` to do so.
- The use of repeated boundary regexps in `gsub()` and `gregexpr()` as warned about in the help page does not work in this engine (it did in the previous one since 2005).
- Extended (and basic) regexps now support same set of options as for `fixed = TRUE` and `perl = TRUE`, including `useBytes` and support for UTF-8-encoded strings in non-UTF-8 locales.
- `agrep()` now has full support for MBCS locales with a modest speed penalty. This enables `help.search()` to use approximate matching character-wise rather than byte-wise.
- `[g]sub` use a single-pass algorithm instead of matching twice and so is usually faster.
- The `perl = TRUE` versions now work correctly in a non-UTF-8 MBCS locale, by translating the inputs to UTF-8.
- `useBytes = TRUE` now inhibits the translation of inputs with marked encodings.
- `strsplit()` gains a `useBytes` argument.

- The algorithm used by `strsplit()` has been reordered to batch by elements of `split`: this can be much faster for `fixed = FALSE` (as multiple compilation of regexps is avoided).
- The help pages, including `?regexp`, have been updated and should be consulted for details of the new implementations.

HELP & Rd FILE CHANGES:

- A new dynamic HTML help system is used by default, and may be controlled using `tools::startDynamicHelp()`. With this enabled, HTML help pages will be generated on request, resolving links by searching through the current `.libPaths()`. The user may set options(`"help.ports"`) to control which IP port is used by the server.
- `help.start()` no longer sets `options(htmlhelp = TRUE)` (it used to on Unix but not on Windows). Nor does it on Unix reset the `"browser"` option if given an argument of that name.
  Arguments `update` and `remote` are now available on all platforms: the default is `update = FALSE` since the http server will update the package index at first use.
- `help()` has a new argument `help_type` (with default set by the option of that name) to supersede arguments `offline`, `htmlhelp` and `chmhelp` (although for now they still work if `help_type` is unset). There is a new type, `"PDF"` to allow offline PDF (rather than PostScript).
  A function `offline_help_helper()` will be used if this exists in the workspace or further down the search path, otherwise the function of that name in the **utils** namespace is used.
- Plain text help is now used as the fallback for HTML help (as it always was for Compiled HTML help on Windows).
- It is possible to ask for static HTML pages to be prebuilt *via* the configure option '`--enable-prebuilt-html`'. This may be useful for those who wish to make HTML help available outside R, e.g. on a local web site.
- An experimental tag `\Sexpr` has been added to Rd files, to evaluate expressions at build, install, or render time. Currently install time and render time evaluation are supported.
- Tags `\if`, `\ifelse` and `\out` have been added to allow format-specific (or more general, using `\Sexpr`) conditional text in man pages.
- The `parse_Rd()` parser has been made more tolerant of coding errors in Rd files: now all syntax errors are reported as warnings, and an attempt is made to continue parsing.
- `parse_Rd()` now has an argument `fragment` (default `FALSE`) to accept small fragments of Rd files (so that `\Sexpr` can output Rd code which is then parsed).
- `parse_Rd()` now always converts its input to UTF-8. The `Rd2*` rendering functions have a new argument, `outputEncoding`, which controls how their output is encoded.
- `parse_Rd()` no longer includes the newline as part of a `"%"`-style comment.
- There have been various bug fixes and code reorganization in the Rd renderers `Rd2HTML`, `Rd2latex`, `Rd2txt`, and `Rd2ex`.
  All example files are now created with either ASCII or UTF-8 encoding, and the encoding is only marked in the file if there is any non-UTF-8 code (previously it was marked if the help file had non-ASCII contents, possibly in other sections).
- `print.Rd()` now adds necessary escape characters so that printing and re-parsing an Rd object should produce an equivalent object.
- `parse_Rd()` was incorrectly handling multiple backslashes in R code strings, converting 4n+3 backslashes to 2n+1 instead of 2n+2.

- `parse_Rd()` now recognizes the `\var` tag within a quoted string in R-like text.
- `parse_Rd()` now treats the argument of `\command` as LaTeX-like, rather than verbatim.

COMPRESSION:

- New function `untar()` to list or unpack tar archives, possibly compressed. This uses either an external `tar` command or an internal implementation.
- New function `tar()` to create (possibly compressed) tar archives.
- New functions `memCompress()` and `memDecompress()` for in-memory compression and decompression.
- `bzfile()` has a `compress` argument to select the amount of effort put into compression when writing.
- New function `xzfile()` for use with `xz`-compressed files. (This can also read files compressed by some versions of `lzma`.)
- `gzfile()` looks at the file header and so can now also read `bzip2`-ed files and `xz`-compressed files.
- There are the new options of `save(compress = "bzip2")` and `"xz"` to use `bzip2` or `xz` compression (which will be slower, but can give substantially smaller files). Argument `compression_level` gives finer control over the space/time tradeoffs. `load()` can read such saves (but only as from this version of R).
- `R CMD INSTALL`/`check` and `tools::writePACKAGES` accept a wider range of compressed tar archives. Precisely how wide depends on the capabilities of the host system's `tar` command: they almost always include `.tar.bz2` archives, and with modern versions of `tar` other forms of compression such as `lzma` and `xz`, and arbitrary extensions.
- `R CMD INSTALL` has a new option '`--data-compress`' to control the compression used when lazy-loading data. New possibilities are '`--data-compress=bzip2`' which will give ca 15% better compression at the expense of slower installation times, and '`--data-compress=xz`', often giving even better compression on large datasets at the expense of much longer installation times. (The latter is used for the recommended packages: it is particularly effective for **survival**.)
- `file()` for open = `""`, `"r"` or `"rt"` will automagically detect compressed files (from `gzip`, `bzip2` or `xz`). This means that compressed files can be specified by file name (rather than *via* a `gzfile()` connection) to `read.table()`, `readlines()`, `scan()` and so on.
- `data()` can handle compressed text files with extensions '`.{txt,tab,csv}.{gz,bz2,xz}`' .

DEPRECATED & DEFUNCT:

- `png(type="cairo1")` is defunct: the value is no longer recognized.
- `tools::Rd_parse()` is defunct (as this version of R uses only Rd version 2).
- Use of file '`~/.Rconf`' (which was deprecated in favour of '`~/.Rconfig`' in 2004) has finally been removed.
- Bundles of packages are deprecated. See 'Writing R Extensions' for the steps needed to unbundle a bundle.
- `help()` arguments `offline`, `htmlhelp` and `chmhelp` are deprecated in favour of `help_type`.
- `clearNames()` (in package **stats**) is deprecated for `unname()`.

- Basic regular expressions (`extended = FALSE`) are deprecated in `strsplit`, `grep` and friends. There is a precise POSIX standard for them, but it is not what recent RE engines implement, and it seems that in almost all cases package authors intended `fixed = TRUE` when using `extended = FALSE`.
- `methods::trySilent()` is deprecated in favour of `try(silent=TRUE)` or – more efficiently and flexibly – something like `tryCatch(error = function(e) e)`.
- `index.search()` is deprecated: there are no longer directories of types other than `help`.

INSTALLATION:

- cairo >= 1.2 is now required (1.2.0 was released in July 2006) for cairo-based graphics devices (which remain optional).
- A suitable `iconv()` is now required: support for configure option '`--without-iconv`' has been withdrawn (it was deprecated in R 2.5.0).
- Perl is no longer 'essential'. R can be built without it, but scripts `R CMD build`, `check`, `Rprof` and `Sd2d` currently require it.
- A system `glob` function is now essential (a working `Sys.glob()` has been assumed since R 2.9.0 at least).
- C99 support for MBCS is now required, and configure option '`--disable-mbcs`' has been withdrawn.
- Having a version of `tar` capable of automagically detecting compressed archives is useful for `utils::untar()`, and so `gtar` (a common name for GNU `tar`) is preferred to `tar`: set environment variable `TAR` to specify a particular `tar` command.

INTERNATIONALIZATION:

- There is some makefile support for adding/updating translations in packages: see `po/README` and 'Writing R Extensions'.
  There is support for the use of `dngettext` for C-level translations in packages: see 'Writing R Extensions'.

BUG FIXES:

- Assigning an extra 0-length column to a data frame by `DF[, "foo"] <- value` now works in most cases (by filling with `NA`s) or fails. (It used to give a corrupt data frame.)
- `validObject()` avoids an error during evaluation in the case of various incorrect slot definitions.
- `n:m` now returns a result of type `"integer"` in a few more boundary cases.
- The `zap.ind` argument to `printCoefmat()` did not usually work as other code attempted to ensure that non-zero values had a non-zero representation.
- `printCoefmat()` formatted groups of columns together, not just the `cs.ind` group but also the `zap.ind` group and a residual group. It now formats all columns except the `cs.ind` group separately (and zaps the `zap.ind` group column-by-column). The main effect will be see in the output from `print.anova()`, as this grouped SS-like columns in the `zap.ind` group.
- `R_ReplDLLinit()` initializes the top-level jump so that some embedded applications on Windows no longer crash on error.
- `identical()` failed to take the encoding of character strings into account, so identical byte patterns are not necessarily identical strings, and similarly Latin-1 and UTF-8 versions of the same string differ in byte pattern.
- `methods(f)` used to warn unnecessarily for an S4 generic `f` which had been created based on an existing S3 generic.

- The check for consistent ordering of superclasses was not ignoring all conditional relations (the symptom was usually spurious warnings for classes extending `"array"`).
- Trying to assign into a raw vector with an index vector containing `NA`s could cause a segfault. Reported by Hervé Pagès.
- `Rscript` could segfault if (by user error) its filename argument was missing. Reported by Martin Morgan.
- `getAnywhere()` (and functions that use it, including argument completion in the console) did not handle special built-in functions. Reported by Romain Francois.
- `order()` was missing a `PROTECT()` call and so could segfault when called on character data under certain (rare) circumstances involving marked non-native encodings.
- `prettyNum(z, drop0trailing=TRUE)` did not work correctly when `z` was a complex vector. Consequently, `str(z, ...)` also did not. (PR#13985)
- `make distclean` removed too many files in `etc/` if builddir = srcdir.
- `R CMD` replaced `TEXINPUTS` rather than appending to it (as documented and intended).
- `help.start()` no longer fails on unix when `"browser"` is a function.
- `pbeta(x, ..., log.p = TRUE)` is sometimes more accurate, e.g., for very small `x`.
- Unserializing a pre-2.8 workspace containing pure ASCII character objects with a Latin-1 or UTF-8 encoding would corrupt the `CHARSXP` cache.

OLDER NEWS

- News for R 2.9.2 patched and earlier can be found in files such as '`NEWS.2`' in the '`doc`' directory.