

# 1 General Information: README

This is the README file for the distribution of ESS version 16.10

ESS is a GNU Emacs and XEmacs mode for interactive statistical programming and data analysis. Languages supported: the S family (S, S-PLUS and R), SAS, BUGS/JAGS and Stata. ESS grew out of the desire for bug fixes and extensions to S-mode and SAS-mode as well as a consistent union of their features in one package.

Installation instructions are provided in sections for both Unix and Windows; see below.

The current development team is led by Martin Maechler since August 2004. Former project leader A.J. (Tony) Rossini ([rossini@blindglobe.net](mailto:rossini@blindglobe.net)) did the initial port to XEmacs and has been the primary coder. Martin Maechler ([maechler@stat.math.ethz.ch](mailto:maechler@stat.math.ethz.ch)) and Kurt Hornik ([Kurt.Hornik@R-project.org](mailto:Kurt.Hornik@R-project.org)) have assisted with the S family and XLispStat. Stephen Eglén ([stephen@gnu.org](mailto:stephen@gnu.org)) has worked mostly on R support. Richard M. Heiberger ([rmh@temple.edu](mailto:rmh@temple.edu)) has assisted with S/S-PLUS development for Windows. Richard and Rodney A. Sparapani ([rsparapa@mcw.edu](mailto:rsparapa@mcw.edu)) have done much of the work improving SAS batch and interactive support. Rodney has also extended ESS to support BUGS/JAGS and has an interest in improving Stata support.

We are grateful to the previous developers of S-mode (Doug Bates, Ed Kademan, Frank Ritter, David M. Smith), SAS-mode (Tom Cook) and Stata-mode (Thomas Lumley).

## 1.1 License

The source and documentation of ESS is free software. You can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2, or (at your option) any later version.

ESS is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License in the file COPYING in the same directory as this file for more details.

## 1.2 Stability

All recent released versions are meant to be release-quality versions. While some new features are being introduced, we are cleaning up and improving the interface. We know that there are many remaining opportunities for documentation improvements, but all contributors are volunteers and time is precious. Patches or suggested fixes with bug reports are much appreciated!

## 1.3 Requirements

ESS is most likely to work with current/recent versions of the following statistical packages: R/S-PLUS, SAS, Stata, OpenBUGS and JAGS.

ESS supports current, and recent, stable versions of GNU Emacs (currently, the 24.x and 25.x series; alpha/beta/pre-release versions are NOT SUPPORTED). Non-Windows users beware: GNU Emacs 24.3 is preferable to 24.1 or 24.2: these broken builds suffer from bug

12463 <http://debbugs.gnu.org/cgi/bugreport.cgi?bug=12463> which will cause Emacs to get progressively slower over time.

Due to XEmacs lacking some features that ESS requires, ESS support of XEmacs ended with ESS 12.04-4.

To build the PDF documentation, you will need a version of TeX Live or texinfo that includes texi2dvi (BEWARE: recent TeX Live, and some texinfo RPMs, do NOT include texi2dvi).

## 1.4 Getting the Latest Version

The latest released version of ESS is always available on the web at: ESS web page (<http://ess.r-project.org>) or StatLib (<http://lib.stat.cmu.edu/general/ESS/>)

### 1.4.1 Git for ESS development

For development and experimentation on new ESS features, there is now a GitHub branch for ESS, available at <https://github.com/emacs-ess/ESS>.

## 1.5 Installation

1. Download the latest zip or tgz archive from ESS downloads area (<http://ess.r-project.org/index.php?Section=download>) and unpack it into a directory where you would like ESS to reside. We will denote this directory as `/path/to/ESS/` hereafter. Alternatively you can use `git` to fetch the most recent development version to your local machine with:

```
git clone https://github.com/emacs-ess/ESS.git /path/to/ESS
```

2. **Optionally**, compile elisp files and build the documentation with:

```
cd /path/to/ESS/  
make
```

Without this step, info, pdf and html documentation and reference card will not be available.

3. **Optionally**, install into your local machine with `make install`. You might need administrative privileges:

```
make install
```

The files are installed into `/usr/share/emacs` directory. For this step to run correctly on Mac OS X, you will need to adjust the `PREFIX` path in `Makeconf`. The necessary code and instructions are commented in that file.

4. If you have performed the `make install` step from above, just add

```
(require 'ess-site)
```

to your `~/.emacs` file. Otherwise, you should add `/path/to/ESS/lisp/` to your emacs load path and then load ESS with the following lines in your `~/.emacs`:

```
(add-to-list 'load-path "/path/to/ESS/lisp/")  
(load "ess-site")
```

5. Restart your Emacs and check that ESS was loaded from a correct location with `M-x ess-version`.

*Note for Windows and Mac OS X users:* The most straightforward way to install Emacs on your machine is by downloading all-in-one (<http://vgoulet.act.ulaval.ca/en/emacs/>) Emacs binary by Vincent Goulet.

*Note for XEmacs users:* Due to XEmacs lacking some features that ESS requires, ESS support of XEmacs ends with ESS 12.04-4. This decision will be re-visited in the future as XEmacs continues to sync with GNU Emacs.

## 1.6 Starting an ESS process

To start an S session on Unix or on Windows when you use the Cygwin bash shell, simply type *M-x S RET*.

To start an S session on Windows when you use the MSDOS prompt shell, simply type *M-x S+6-msdos RET*.

## 1.7 Current Features

- Languages Supported:
  - S family (R and S+ AKA S-PLUS)
  - SAS
  - OpenBUGS/JAGS
  - Stata
  - Julia
- Editing source code (S family, SAS, OpenBUGS/JAGS, Stata, Julia)
  - Syntactic indentation and highlighting of source code
  - Partial evaluation of code
  - Loading and error-checking of code
  - Source code revision maintenance
  - Batch execution (SAS, OpenBUGS/JAGS)
  - Use of imenu to provide links to appropriate functions
- Interacting with the process (S family, SAS, Stata, Julia)
  - Command-line editing
  - Searchable Command history
  - Command-line completion of S family object names and file names
  - Quick access to object lists and search lists
  - Transcript recording
  - Interface to the help system
- Transcript manipulation (S family, Stata)
  - Recording and saving transcript files
  - Manipulating and editing saved transcripts
  - Re-evaluating commands from transcript files
- Interaction with Help Pages and other Documentation (R)
  - Fast Navigation

- Sending Examples to running ESS process.
- Fast Transfer to Further Help Pages
- Help File Editing (R)
  - Syntactic indentation and highlighting of source code.
  - Sending Examples to running ESS process.
  - Previewing

## 1.8 New Features

Changes and New Features in 16.10:

- ESS[R]: Syntax highlighting is now more consistent. Backquoted names are not fontified as strings (since they really are identifiers). Furthermore they are now correctly recognised when they are function definitions or function calls.
- ESS[R]: Backquoted names and `%op%` operators are recognised as sexp. This is useful for code navigation, e.g. with `C-M-f` and `C-M-b`.
- ESS[R]: Integration of outline mode with roxygen examples fields. You can use outline mode's code folding commands to fold the examples field. This is especially nice to use with well documented packages with long examples set. Set `ess-roxy-fold-examples` to non-nil to automatically fold the examples field when you open a buffer.
- ESS[R]: New experimental feature: syntax highlighting in roxygen examples fields. This is turned off by default. Set `ess-roxy-fontify-examples` to non-nil to try it out.
- ESS[R]: New package development command `ess-r-devtools-ask` bound to `C-c C-w C-a`. It asks with completion for any devtools command that takes `pkg` as argument.
- ESS[R]: New command `C-c C-e C-r` to reload the inferior process. Currently only implemented for R. The R method runs `inferior-ess-r-reload-hook` on reloading.
- ESS[R]: `ess-r-package-mode` is now activated in non-file buffers as well.

Bug fixes in 16.10:

- ESS[R]: Fix broken (un)flagging for debugging inside packages
- ESS[R]: Fixes (and improvements) in Package development
- ESS[R]: Completion no longer produces `...=` inside `list( )`.
- ESS[R]: Better debugging and tracing in packages.
- ESS[R]: Better detection of symbols at point.
- ESS[R]: No more spurious warnings on deletion of temporary files.
- ESS[julia]: help and completion work (better)
- ESS[julia]: available via `ess-remote`

Changes and New Features in 16.04:

- ESS[R]: `developer` functionality has been refactored. The new user interface consists of a single command `ess-r-set-evaluation-env` bound by default to `C-c C-t C-s`. Once an evaluation environment has been set with, all subsequent ESS evaluation will source the code into that environment. By default, for file within R packages the evaluation environment is set to the package environment. Set `ess-r-package-auto-set-evaluation-env` to nil to disable this.

- ESS[R]: New **ess-r-package-mode** This development mode provides features to make package development easier. Currently, most of the commands are based on the **devtools** packages and are accessible with **C-c C-w** prefix. See the documentation of **ess-r-package-mode** function for all available commands. With **C-u** prefix each command asks for extra arguments to the underlying devtools function. This mode is automatically enabled in all files within R packages and is indicated with **[pkg:NAME]** in the mode-line.
- ESS[R]: Help lookup has been improved. It is now possible to get help for namespaced objects such as `pkg::foobar`. Furthermore, ESS recognizes more reliably when you change `options('html_type')`.
- ESS[R]: New specialized breakpoints for debugging magrittr pipes
- ESS: ESS now implements a simple message passing interface to communicate between ESS and inferior process.

Bug fixes in 16.04:

- ESS[R]: Roxygen blocks with backtics are now correctly filled
- ESS[R]: Don't skip breakpoints in magrittr's `debug_pipe`
- ESS[R]: Error highlighting now understands 'testthat' type errors
- ESS[Julia]: Added `getwd` and `setwd` generic commands

Changes and New Features in 15.09:

- ESS[R]: The indentation logic has been refactored. It should be faster, more consistent and more flexible. There are three types of indentation settings, those starting with **ess-offset-** give the actual offsets, those starting with **ess-indent-** are control (commonly Boolean) variables, and those starting with **ess-align-** are vertical alignment overrides which inhibit default offsets in specific situations. See **ess-style-alist** for detailed description of the new indentation system and provided default indentation styles.
- ESS[R]: Deprecation of old indentation settings. As a consequence of the indentation re-factoring **ess-brace-imaginary-offset**, **ess-expression-offset** and all delimiter-specific offsets are deprecated. The settings for indentation of continued statements have been replaced by **ess-offset-continuations**. It can be set to either **cascade** or **straight** (the default). **ess-arg-function-offset** has been replaced by **ess-indent-from-lhs** and has been generalised to assignments. This setting now works with both statement blocks and expressions and only takes effect for offsets set to **prev-call** and **open-delim** in order to produce a consistent indentation.
- ESS: A test framework has been set up.
- ESS[R]: A new RStudio style is provided to mimic as closely as possible R files indented via RStudio. To reproduce the setup of some of the RStudio users, the RStudio- style with **ess-offset-arguments** set to **prev-line** is also provided. In addition, the new RRR+ style is equivalent to RRR except it indents blocks in function calls relatively to the opening delimiter. This style does not try to save horizontal space and produces more indentation.
- ESS[R]: Roxygen fields will now be indented on paragraph refilling in order to make the documentation more readable. You can also refill commented lines in the **examples** field without squashing the surrounding code in the comments.

- ESS[R]: ESS can now format your code! This is controlled through the settings `ess-fill-calls` and `ess-fill-continuations`. When activated, (`fill-paragraph`) formats your calls and your formulas/continuations while making sure they don't go past `fill-column`. Repeated refills cycle through different styles (see the docstrings for more details). By default, the refilled region blinks. Set `ess-blink-filling` to nil to prevent this.
- ESS[R]: Fix occasional missing error location fontification in inferior buffers.
- ESS[R]: `ess-developer` now correctly assigned the environment of new functions to the package namespace.
- ESS[Julia]: `?[topic]` now works in the `*julia*` buffer. Note that support for editing Julia code now depends on `julia-mode.el` from the Julia project. If you install ESS from the official tarball/zip file, `julia-mode.el` is already included. Otherwise, if you install ESS by running `make`, then the latest version of `julia-mode.el` is downloaded (and so you need an active internet connection to install) during the installation process. Alternatively, if you run ESS without running `make`, then ensure that you have the `julia-mode.el`, which you can get easily from MELPA for example.
- iESS: For naming inferior processes, ESS can use `projectile`'s project root and it does so when `ess-gen-proc-buffer-name-function` is set to `ess-gen-proc-buffer-name:projectile-or-simple` as by default, or to another value beginning with `ess-gen-proc-buffer-name:projectile-*`.

#### Changes and New Features in 15.03-1:

- ESS[R]: An indentation bug has been fixed (github issue 163)
- ESS[R]: On windows, if `'ess-prefer-higher-bit'` is non-nil (the default), then R-newest will try to run a 64 bit (rather than 32 bit) version of R.

#### Changes and New Features in 15.03:

- ESS[R]: Full native support for `'company-mode'`.
- ESS[R]: More efficient caching algorithm for R completion.
- ESS: New offset variable `'ess-close-paren-offset'` to control the indentation of the closing parentheses.
- ESS[R]: Ask for CRAN mirror only once per emacs session.
- ESS[R]: Detect `library` and `require` calls for better completion caching.
- Buffer display is now customizable (`ess-show-buffer-action`).
- Use `y-or-n-p` instead of `yes-or-no-p` throughout.
- More support for ODS in `ess-sas-graph-view`.
- Makefiles are now both UNIX and GNU friendly.
- ESS[R]: Simplify directory lookup in `ess-developer` (#137).
- Make closed paren indentation consistent

#### Bug Fixes in 15.03:

- Fix open brace indentation bug (#27 in `ess/R-ESS-bugs.R`).
- Fix git version lookup
- Don't check directory modtime in R dialect.

- Declare all `ess` macros for `edebug`.
- Add `ess-smart-comma` to `eldoc` message functions.
- Inform users when retrieving RDA aliases.
- Line ending in `'~'` is also a continuation line.
- Filing roxy paragraphs works as expected now.
- In `ess-developer-add-package`, remove incorrect `'wait'` argument from `ess-get-words-from-vector` call.
- Fix #96, #117, #120, #125, #134, #137.
- Fix `ess-quit-r`. Call `base::q()` even if it is masked.
- Fix `'ess-show-buffer'` to always display the buffer in another window.
- Makefile: Fix `cd` bug for directories with spaces in them
- `ess-kill-buffer-and-go` modified to not restart R

Changes / Selected Bug Fixes in 14.09:

- ESS[Julia]: Executable is changed to `julia`.
- ESS[Julia]: Completion and help system was adjusted to Julia v.0.3.0. Julia v.0.2.x is no more supported.
- ESS[R]: Running R with `gdb` debugger now works as expected
- iESS: Inferior ESS buffers are now derived from `comint-mode`
- ESS[R]: `ess-execute-screen-options` uses correct screen width in terminal sessions
- ESS: `ess-build-tags-for-directory` works when no TAGS file name was provided
- ESS: `ess-offset-statement-continued` is now respected everywhere except inside of the `if` test condition.
- ESS: New variable `ess-offset-statement-first-continued` for indentation of the first line in multiline statements.
- ESSR: Starting `,` in multiline statements indentation is now ignored to achieve a more pleasant alignment.
- ESSR: Improved behavior of `RET` in roxygen blocks.
- ESS[R]: command cleaning with `C-u C-u C-y` was broken with lines containing `" + "`
- ESS[R]: fixed "empty watch window bug"
- ESS[R]: don't ask for help location on `ac-quick-help` (request of github #81)
- ESS[R]: `"importClassesFrom"` and `"importMethodsFrom"` were added to the list of two-parameter roxygen commands
- ESS[R]: fix vignettes display and hyperlinks (were broken in 13.09-1)
- ESS[Julia]: recognize function names ending with `!`
- ESS[Julia]: fix indentation of `"for"` comprehension syntax within brackets.

Changes / Selected Bug Fixes in 13.09-1:

- `ess-remote` and `TRAMP`: R support code is now downloaded in binary form instead of being injected from local machine. The R code is stored in `~/.config/ESSR/` directory on the remote machine
- `TRAMP`: `PAGER` environment variable is now correctly set to `inferior-ess-pager`

- retrieval of help topics on remote machines is fixed
- org-babel: source references of R code executed from org files correctly point to source references in original org files (version 8.2.1 or higher of org-mode is required for this feature)
- `ess-execute` is now bound to `C-c C-e C-e` in `ess-extra-map`.
- completion works again in `ess-execute`
- ESS[R]: `head` and `tail` methods were replaced by `htsummary` in `ess-R-describe-object-at-point-commands`
- ESS[roxygen]: evaluation commands now work in roxygen blocks. Leading comments are automatically removed before the evaluation
- ESS[transcript]: 'Clean Region' now works with multiline statements; `ess-transcript-clean-region` etc. correctly treat multiline statements, i.e., no longer forgets the lines typically preceded by '+'
- ESS[SAS]: Three features/fixes with special thanks to Matthew Fidler <https://github.com/emacs-ess/ESS/pulls/mlf176f2> (<https://github.com/emacs-ess/ESS/pulls/mlf176f2>). Turn on SAS log mode when appropriate. Indent comments and CARDS statement more appropriately.
- ESS[SAS]: `ess-sas-edit-keys-toggle` default returns to `nil`
- ESS[R]: support for `prettify-symbols-mode`: contribution from Rudiger Sonderfeld <https://github.com/emacs-ess/ESS/pull/65>
- ESS[SWV]: knitr now evaluates in the current frame
- ESS[developer]: `ess-developer` doesn't kill open DESCRIPTION files anymore
- ESS[roxygen]: `ess-roxy-preview-HTML` is now on `C-c C-o C-w` and `ess-roxy-preview-text` is now on `C-c C-o C-t`
- ESS: installation with `make install` was simplified and should work out of the box on most \*nix systems
- ESS installation instructions simplified
- fixed font-lock bug introduced in 13.09 that was causing very slow process output

#### Changes/New Features in 13.09:

- font-lock in process buffers doesn't "spill" over prompts. Missing closing string delimiters should not cause wrong fontification of the following command input.
- ESS[julia]: full features M-TAB completion and auto-complete support, which now works for modules, structures and data types.
- ESS[julia]: a much better eldoc showing arguments of methods and data type constructors
- ESS-developer:
  - ESS-developer work-flow pattern has been streamlined: ESS-developer is now automatically activated on per-file basis if the file is part of a developed package `ess-developer-packages`. The old behavior (activation on per-process basis) is still available on M-x `ess-developer` in a process buffer.
  - integration with `devtools` package. New command `ess-developer-load-package` calls `load_all` on the package containing current file.



`ess-developer-add-package` now offers IDO menu completions with available loading methods, currently `library`, and `load_all`. Loading command can be customized with `ess-developer-load-on-add-commands`.

- `TAB` now indents region if region is active (a contribution of Matthew Fidler in pull #41)
- `M-x ess-version` now reports full loading path and recognizes git and ELPA versions.
- warning and error keyword are now highlighted with `font-lock-warning-face` as they should be, (for quite some time these keywords have been hijacked by compilation mode fontification).
- `eldoc`: Eldoc now recognizes multiple processes. If current process is busy, or current buffer is not associated with a process, eldoc picks its completions from the first available free process.
- `org-babel`: evaluation is now org-friendly
- `help`: new help buffers now try to reuse `ess-help` buffers. This behavior is controlled by `ess-help-reuse-window` custom variable.
- `help`: `?foo` pops IDO menu on multiple help files (so far it worked only for `C-c C-v`)
- remote evaluation is considerably faster now on slow connections
- `ESS[R]` tracebug R source references regular expressions are (mostly) language agnostic.
- `ess-function-call-face` inherits from `font-lock-function-name-face` rather than `font-lock-builtin-face`.
- `ess-inject-source` now accepts `function-and-buffer` option.
- Documentation: The “New Features” section (and `NEWS`) now represent recent changes: within the last year or so. All changes can be found in the new `news.html` (`news.html`) (or `NEWS` and `ONEWS`).
- `ESS[R]` `ess-rep-regexp` should no longer `inf.loop` (rarely!), and hence `M-x ess-fix-miscellaneous` should neither.

Changes/New Features in 13.05:

- `ESS[gretl]`: Support for `gretl` (both editing and sub-process interaction). A contribution of Ahmadou Dicko.
- `ESS`: process output display is 4-10 times faster due to new caching and only occasional emacs re-display (for the moment this functionality is available only when `ess-tracebug` is active).
- `ESS`: `C-c ‘` is now bound to `ess-show-traceback` and `C-c ~` is bound to `ess-show-call-stack`.
- `ESS[R]`: `ESS` stores function in `'ESSR'` environment to avoid kludging users' global environment and accidental deletion.
- `ESS[R]`: new variable `ess-swv-processing-command` to control weaving and tangling.
- `ESS[R]`: `ess-default-style` has been changed (from `DEFAULT`) to `RRR`. Use something like `(setq ess-default-style 'DEFAULT)` or `(setq ess-indent-level 2)` in your `~/.emacs` equivalent *before* loading `ESS`, if you do not like this new “incompatible” default style.
- `ESS[julia]`: `ESS` stores its functions in `'ESS'` module.

- ESS[julia]: Eldoc is now supported in julia modes
- ESS[julia]: Adjusted error reference detection and interactive help to julia internal changes
- ESS[R]: `ess-use-tracebug`'s default has been changed to `t`. Set it to `nil` if you want to keep the previous behavior.
- ESS[tracebug]: Electric debug keys have been removed [breaking change] The functionality was replaced with `ess-debug-minor-mode` and `ess-debug-minor-mode-map`.
- ESS[tracebug]: `ess-tracebug-map` is an alias to `ess-dev-map` `C-c C-t`.
- ESS[tracebug]: `ess-bp-toggle-state` (`C-c C-t o`) can now be used during the debug session to toggle breakpoints on the fly (suggestion by Ross Boylan).
- ESS[tracebug]: `ess-debug-flag-for-debugging` and `ess-debug-unflag-for-debugging` work correctly from the debugging contexts. These commands also recognize non-exported functions for the packages listed in `ess-developer-packages` (`C-c C-t C-a`).
- ESS[R]: Eldoc (activated by `ess-use-eldoc`) has become more sophisticated, and hence also more intruding in the interface between the Statistics software, e.g., R, and the user. Note that you can turn off Eldoc, by placing `(setq ess-use-eldoc nil)` in your `~/.emacs` file, prior to loading ESS,
- ESS[SAS]: long over-looked `SAS-mode-hook` appears!
- ESS[SAS]: `ess-sas-edit-keys-toggle` now defaults to `t` since `sas-indent-line` is still broken, i.e. `TAB` is now bound to `ess-sas-tab-to-tab-stop` by default

#### Changes/Bug Fixes in 12.09-2:

- ESS: new `ess-switch-to-end-of-proc-buffer` variable that controls whether `C-c C-z` switches to the end of process buffer. The default is `t`. You can use prefix argument to `C-c C-z` to toggle this variable.
- ESS: fix in `ess-eval-linewise` that was causing emacs to hang during R debugging with `ess-eval-visibly` equal to `t`.
- ESS: fix in `ess-eval-linewise` that was causing emacs to recenter the prompt in visible window
- ESS[tracebug]: A better handling of “Selection” prompts and debug related singlekey commands.
- ESS: fix a bug in `ess-switch-process` that was causing `*new*` selection to fail.
- ESS[R]: Solve missing `ess-local-process-name` bug in R-dired.
- ESS[SWV]: `ess-swv-PDF` doesn't ask for a command to run if there is only one command in `ess-swv-pdflatex-commands`.
- ESS[SWV]: `ess-swv-weave` gained an universal argument to allow for an interactive choice between available weavers (sweave, knitr).
- ESS: `ess-eval*-and-step` functions go to next empty line at eob, instead of staying at the last line.

#### Changes/New Features in 12.09-1:

- ESS *Breaking Changes in Keys*:
  - New keymaps: `ess-doc-map` bound to `C-c C-d`; `ess-extra-map` bound to `C-c C-e`; `ess-dump-object-into-edit-buffer` was moved on `C-c C-e C-d`

- roxygen map was moved on *C-c C-o* and *ess-roxy-update-entry* now resides on *C-c C-o C-o*
  - *ess-handy-commands* is not bound anymore
  - *ess-dev-map* (including *ess-tracebug* and *ess-developer*) moved on *C-c C-t*
  - *C-c C-y* is deprecated in favor of *C-c C-z C-z*
- ESS[R] new command *ess-describe-object-at-point* bound to *C-c C-d C-e* (repeat *C-e* or *e* to cycle). It was inspired by Erik Iverson’s *ess-R-object-tooltip*. Customize *ess-describe-at-point-method* to use tooltip instead of an electric buffer.
- ESS: New command *ess-build-tags-for-directory* bound to *C-c C-e C-t* for building dialect specific tag tables. After building tags use *M-.* to navigate to function and objects definitions. By default *C-c C-e C-t* builds tags based on imenu regular expressions and also include other common languages *.c*, *.o*, *.cpp* etc. But it relies on external *find* and *etags* commands. If *ess-build-tags-command* is defined (for R), the inferior process is asked to build tags instead.
- ESS: *ess-switch-process* offers *\*new\** alternative to start a new process instead of switching to one of the currently running processes.
- ESS: Switching between processes (*C-c C-s*) uses buffer names instead of the internal process names. Use *M-x rename-buffer* command to conveniently rename your process buffers.
- ESS: Process buffers can be automatically named on process creation according to user specified scheme. Default schemes are *\*proc\**, *\*proc:dir\** and *\*proc:abbr-long-dir\** where *proc* stands for the internal process name and *dir* stands for the directory where the process was started in. The default is *\*proc\**. For customization see *ess-gen-proc-buffer-name-function*.
- ESS: *ess-eval-visibly-p* is deprecated in favor of *ess-eval-visibly*.
- ESS: New evaluation pattern *nowait*. In addition to old *nil* and *t* values, *ess-eval-visibly* accepts *nowait* for a visible evaluation with no waiting for the process. See *ess-eval-visibly* for details on evaluation patterns.
- ESS: New “Process” menu entry with process related commands and configuration
- iESS: Process buffer is now automatically shown on errors
- ESS: New *ess-switch-to-inferior-or-script-buffer* command bound to *C-c C-z* in both script and process buffers. If invoked from process buffer it switches to the most recent buffer of the same dialect. It is a single key command.
- ESSR-help: On multiple help pages with the same name, *C-c C-v* now asks for user resolution directly in emacs.
- ESS[R] *ess-roxy*: new variable *ess-roxy-re* for fontification of cases where the number of leading *#* differs from *ess-roxy-str*.
- ESS[R] Eldoc was considerably enhanced. It now finds hidden default S3 methods and displays non-default methods’ arguments after trailing *||*.
- ESS[R]: New *ess-display-demos* command bound to *C-c C-d o* and *C-c C-d C-o*
- ESS: New *ess-help-web-search* command bound to *C-c C-d w* and *C-c C-d C-w* to facilitate interactive search of web resources. Implemented for R, Stata and Julia. See also *ess-help-web-search-command*.

- ESS: `ess-pdf-viewer-pref` accepts now command line arguments
- ESS[Rnw]: Add knitr support. Customize `ess-svw-processor` for the default processor.
- ESS[Rnw]: More thorough renaming of remaining `noweb-*` to `ess-noweb-*`.
- ESS[Rnw] new commands `ess-eval-chunk-and-step` and `ess-eval-chunk` bound to *M-n C-c* and *M-n C-M-x* to mirror standard ess commands in C-c map.
- ESS[R] Auto-completion: new variable `ess-ac-R-argument-suffix` to customize the insertion of trailing `"=`". Defaults to `" = "`.
- ESS[Julia]: Added index, apropos and web-search to julia.
- ESS help: More evaluation commands were added to `ess-help` mode (*C-c C-c*, *C-M-x* etc)

Bug Fixes in 12.09-1:

- iESShelp: Multiple help pages with the same name are properly handled on *C-c C-v*
- iESSremote: Evaluation with ESS remote no longer freezes emacs.
- iESS: `comint-previous-prompt C-c C-p` no longer stops on secondary prompt `"+"`.
- iESS[R], iESS(Sqpe) [S] on Windows: The `options("editor")` is now initialized to `emacsclient` instead of the previous `gnuclient`. The user may need to add the line `(server-start)` to the emacs initialization file. `emacsclient` has been included with emacs since GNU Emacs 22.1.
- ESS[Rnw] Fixed “connection to R” bug (in 12.09 only).
- ESS[Rnw] Explicit `ess-svw-stangle` and `ess-svw-sweave` functions.
- ESS[Rnw] Fixed completion and smart underscore problems cause by unmatched `"\"`
- ESS[R] is more careful with the R code injection. It now happens only once at the start of the session.
- ESS[R]: Fixed auto-scrolling the `comint` buffer on evaluation.
- ESS[Julia]: Solve several indentation and word navigation problems.
- ESS[Julia]: Help system works again.

Changes/New Features in 12.09:

- **Due to XEmacs lacking some features that ESS requires, ESS support of XEmacs ends with ESS 12.04-4. This decision will be re-visited in the future as XEmacs continues to sync with GNU Emacs.**
- ESS[R]: On Windows, there is now a new customizable variable (currently called `ess-directory-containing-R`) to tell ESS where to look for the `Rterm.exe` executables. The name of the variable and the values it can take are both in beta and subject to change. Prior to this variable, ESS searched only in the default installation directory. Setting this variable now tells ESS how to find `Rterm.exe` executables when they are installed somewhere else.
- ESS[julia]: *new* mode for editing julia code (`*.jl`). Start with *M-x julia*. Full interaction interface, imenu and basic error referencing are available.
- ESS[R] `noweb`: `noweb-mode` and `noweb-font-lock-mode` have been renamed to `ess-noweb-mode` and `ess-noweb-font-lock-mode` to avoid conflicts with the “real” `noweb-mode`.

- ESS[R] noweb: The long standing font-lock bug has been solved in `ess-noweb` interface.
- ESS: Basic evaluation keys are now bound to `ess-eval-region-*-` functions:
  - `C-M-x` is bound to `ess-eval-region-or-function-or-paragraph`
  - `C-c C-c` is bound to `ess-eval-region-or-function-or-paragraph-and-step`
  - `C-RET` is bound to `ess-eval-region-or-line-and-step`

Each of these functions first evaluates the region whenever the region is active.

- ESS: `C-M-a/C-M-e` now step to beginning/end of paragraph if no function has been detected.
- ESS: `ess-eval-*-and-step` family of functions are now smarter, and don't step to end of buffer or end of chunk code (`@`) when at the end of the code.
- ESS: `ess-handy-commands` function is bound to `C-c h`
- ESS: ESS is now *blinking* the evaluated region. Set `ess-blink-region` to nil to deactivate; `ess-blink-delay` gives the duration of the blink. Evaluated region is “blinked” in *highlight* face.
- ESS[R-help] New key `a` for “apropos()” in help buffers. Also available through `C-c h`.
- ESS[R-help] All R commands of type `foo?bar` and `foo??bar` are recognized and redirected into appropriate `*ESS-help*` buffers.
- ESS[R]: New customization interface for *font-lock*.

ESS font-lock operates with predefined keywords. Default keywords are listed in `ess-R-font-lock-keywords` and `inferior-R-font-lock-keywords`, which see. The user can easily customize those by adding new keywords. These variables can also be interactively accessed and saved through *ESS/Font-lock* submenu.

Several new fontification keywords have been added. Most notably the keywords for highlighting of function calls, numbers and operators.

- ESS[R]: auto-complete is now activated by default whenever auto-complete package is detected. Set `ess-use-auto-complete` to nil to deactivate.
- ESS[R]: R AC sources are no longer auto-starting at 0 characters but at the default `ac-auto-start` characters.
- ESS no longer redefines default ac-sources, but only appends `ac-source-filename` to it.
- ESS: `ac-source-R` now concatenates “ = “ to function arguments.
- ESS: Menus for ESS and iESS have been reorganized and enriched with *Tracebug* and *Developer* submenus.
- ESS[R]: `ess-developer` and `ess-tracebug` commands are available by default in `ess-dev-map` which is bound to `C-c d` in ESS and iESS maps.
- ESS[R]: `eldoc` truncates long lines whenever `eldoc-echo-area-use-multiline-p` is non-nil (the default). Set this variable to t if you insist on multiline eldoc. See also `ess-eldoc-abbreviation-style`.
- ESS[R]: completion code pre-caches arguments of heavy generics such as `plot` and `print` to eliminated the undesirable delay on first request.
- iESS: Prompts in inferior buffers are now highlighted uniformly with `comint-highlight-prompt` face.

- ESS[R]: R process no longer wait for the completion of input in inferior buffer. Thus, long running commands like `Sys.sleep(5)` no longer stall emacs.
- ESS: [R, S, Stata, Julia] have specialized `ess-X-post-run-hooks`, which are run at the end of subprocess initialization.
- ESS[Stata]: All interactive evaluation commands work as expected. On-line comments are removed before the evaluation and multiline comments are skipped on `C-c C-c` and other interactive commands.
- ESS no longer auto-connects to a subprocess with a different dialect than the current buffer's one.
- ESS: `ess-arg-function-offset-new-line` is now a list for all the ESS indentation styles, which results in the following indentation after an open “(”:  

```

a <- some.function(other.function(
    arg1,
    arg2)

```
- ESS[SAS]: Improved MS RTF support for GNU Emacs; try `ess-sas-rtf-portrait` and `ess-sas-rtf-landscape`.

#### Changes/Bug Fixes in 12.04-3:

- ESS: basic support for package.el compatibility
- ESS[R]: correct indentation of & and | continuation lines
- M-x `ess-version` shows the svn revision even after `make install`
- ESS[SAS]: improved XEmacs support
- iESS[R]: better finding of previous prompt
- ESS[Stata]: adjusted prompt for mata mode
- ESS[R]: resolved name clashes with cl.el
- ESS[R]: removed dependence on obsolete package assoc
- New `make` target `lisp`, to build the lisp-only part, i.e., not building the docs.

#### Changes/New Features in 12.04-1:

- iESS[Stata]: New interactive help invocation.
- iESS[Stata]: New custom variable `inferior-STA-start-file`.
- iESS[Stata]: `inferior-STA-program-name` is now “stata” and can be customized.
- ESS[Stata] New sections in stata help files `Syntax(s-S)`, `Remarks(r)`, `Title(t)`.

#### Bug Fixes in 12.04-1:

- ESS[R]: Better `ess-tracebug` error handling.
- ESS[R]: Corrected `ess-eldoc` help string filtering and improved argument caching.
- ESS[R]: Indentation of non-block if/else/for/while lines fixed.
- M-x `ess-version` should work better.
- ESS: Filename completion now again works inside strings.
- iESS[Stata]: Fixed prompt detection issue.
- ESS[Rd]: R is autostarted also from here, when needed.

Changes/New Features in 12.04:

- ESS: Reverting new behavior of 12.03, *TAB* in *ess-mode* no longer completes by default. If you want smart *TAB* completion in R and S scripts, similarly to iESS behavior, set the variable `ess-tab-complete-in-script` to `t`. Also see `ess-first-tab-never-complete` for how to customize where first *TAB* is allowed to complete.
- ESS: completion is consistently bound to *M-TAB* (aka *M-C-i*) in both Emacs23 and Emacs24.
- ESS: The variable `ess-arg-function-offset-new-line` introduced in ESS(12.03) now accepts a list with the first element a number to indicate that the offset should be computed from the indent of the previous line. For example setting it to `'(2)` results in:

```
a <- some.function(  
  arg1,  
  arg2)
```

Changes/New Features in 12.03:

- ESS indentation: new offset variable `ess-arg-function-offset-new-line` controlling for the indentation of lines immediately following open `'(`. This is useful to shift backwards function arguments after a long function call expression:

```
a <- some.function(  
  arg1,  
  arg2)
```

instead of the old

```
a <- some.function(  
                                arg1,  
                                arg2)
```

If `'(` is not followed by new line the behavior is unchanged:

```
a <- some.function(arg1,  
                   arg2)
```

This variable should be set as part of indentation style lists, or in *ess-mode* hook.

- ESS[R]: `C-c .` sets (indentation) style.
- ESS: In ESS buffers `yank(C-y)` command accepts double argument `C-u C-u` to paste commands only. It deletes any lines not beginning with a prompt, and then removes the prompt from those lines that remain. Useful to paste code from emails, documentation, inferior ESS buffers or transcript files.
- Documentation: ESS user manual has been rearranged and completed with several new chapters and sections to reflect newly added features (“Completion”, “Developing with ESS”, “ESS tracebug”, “ESS developer”, “ESS Eldoc”, “IDO Completion” and “Evaluating Code”)
- RefCard: Reference card was updated to include new features.
- Eldoc: Eldoc was rewritten and is activated by default. See `ess-use-eldoc`, `ess-eldoc-show-on-symbol`, `ess-eldoc-abbreviation-style` variables for how to change the default behavior. *Note:* `skeleton-pair-insert-maybe` prohibits eldoc display, on `(` insertion.

- ESS[R]: Eldoc shows arguments of a generic function whenever found.
- ESS: `TAB` in `ess-mode` now indents and completes, if there is nothing to indent. Set `ess-first-tab-never-completes-p` to `t` to make `TAB` never complete on first invocation. Completion mechanism is similar to the completion in the `inferior-ess-mode` – a filename expansion is tried, if not found ESS completes the symbol by querying the process.
- ESS for emacs version 24 or higher: ESS is fully compatible with the emacs 24 completion scheme, i.e. all the completion is done by `completion-at-point`. Also in accordance with emacs conventions, ESS doesn't bind `M-TAB` for emacs 24 or higher. `M-TAB` calls the default `complete-symbol`.
- ESS[R]: Out of the box integration with Auto Completion mode <http://cx4a.org/software/auto-complete> (<http://cx4a.org/software/auto-complete>) . Three AC sources `ac-source-R-args`, `ac-source-R-objects` and `ac-source-R` are provided. The last one combines the previous two and makes them play nicely together. Set `ess-use-auto-complete` to `t` to start using it. Refer to documentation string of `ac-use-auto-complete` for further information.
- ESS[R]: New unified and fast argument completion system, comprised of `ess-funname.start`, `ess-function-arguments`, `ess-get-object-at-point`. Eldoc and auto-completion integration are using this system.
- ESS: `ess-switch-to-end-of-ESS(C-c C-z)`, and `ess-switch-to-ESS(C-c C-y)`: Automatically start the process whenever needed.
- ESS[R]: `roxy` knows about previewing text version of the documentation. Bound to `C-c C-e t`.
- ESS[R]: Solved the “nil filename” bug in roxygen support.
- ESS[R]: `ess-tracebug` is now part of ESS:

#### New Features:

- Source injection: Tracebug now can inject source references on the fly during code evaluation, i.e. you don't have to source your file, but just evaluate your code in normal fashion. Variable `ess-tracebug-inject-source-p` controls this behavior - if `t`, always inject source reference, if `'function`, inject only for functions (this is the default), if `nil`, never inject.  
During the source injection the value of `ess-eval-visibly` is ignored.
- Org-mode support: Visual debugger is now aware of the temporary org source editing buffer (`C-c '`) and jumps through this buffers if still alive, or in original org buffer otherwise.
- New keys in watch mode: `?` and `d`
- Two new hooks: `ess-tracebug-enter-hook` and `ess-tracebug-exit-hook`
- ESS[R]: New package `ess-developer` to evaluate R code directly in the package environment and namespace. It can be toggled on and off with `C-c d t`. When `ess-developer` is on all ESS evaluation commands are redefined to evaluate code in appropriate environments. Add package names to the list of your development packages with `C-d a`, and remove with `C-d r`. Source the current file with `C-d s`. Evaluation function which depend on `'ess-eval-region` ask for the package to source the code into, `ess-eval-function` and alternatives search for the function name in the development packages'



environment and namespace and insert the definition accordingly. See the documentation section “Developing with ESS/ESS developer” for more details.

- ESS[R] help system:

New Features:

- `q` quits window instead of calling `ess-switch-to-end-of-ESS`. This is consistent with emacs behavior help and other special buffers (*breaking change*).
  - `k` kills window without asking for the name (pointed by Sam Steingold)
  - Help map inherits from `special-mode-map` as suggested by Sam Steingold.
  - Package index: new function `ess-display-index` bound to `i` in help mode map.
  - Package vignettes: new function `ess-display-vignettes` bound to `v` in help mode map.
  - Display help in HTML browser: new function `ess-display-help-in-browser` bound to `w` in help mode map. It depends on R’s `browser` option.
  - New custom variable `ess-help-pop-to-buffer`: if non-nil ESS help buffers are given focus on display. The default is `t` (*breaking change*).
  - New menu entries for the above functions.
  - Bogus help buffers are no longer generated by default, i.e. buffers of the form “No documentation for ‘foo’ in specified packages and libraries: you could try ‘??foo’”. `ess-help-kill-bogus-buffers` now defaults to `t`. Beware, there may be instances where the default is unsatisfactory such as debugging and/or during R development. Thanks to Ross Boylan for making the suggestion, Sam Steingold for reminding us of this variable and Martin Maechler for the warning.
- ESS now uses IDO completing read functionality for all the interactive requests. It uses ido completion mechanism whenever available, and falls back on classical completing-read otherwise. You can set `ess-use-ido` to nil if you don’t want the IDO completion. See the documentation string of `ess-use-ido` for more information about IDO and ESS configuration.
  - ESS[S]: “,” is bound to `ess-smart-comma`: If comma is invoked at the process marker of an ESS inferior buffer, request and execute a command from ‘`ess-handy-commands`’ list. If `ess-R-smart-operators` is `t` ‘`ess-smart-comma`’ also inserts “ “ after comma.
  - ESS[S], notably R: Variable ‘`ess-handy-commands`’ stores an alist of useful commands which are called by `ess-smart-comma` in the inferior buffer.

Currently containing:

change-directory	<code>ess-change-directory</code>
help-index	<code>ess-display-index</code>
help-object	<code>ess-display-help-on-object</code>
vignettes	<code>ess-display-vignettes</code>
objects[ls]	<code>ess-execute-objects</code>
search	<code>ess-execute-search</code>

```

set-width    ess-execute-screen-options
install.packages
              ess-install.packages
library      ess-library
setRepos     ess-setRepositories
sos          ess-sos

```

Handy commands: `ess-library`, `ess-install.packages`, etc - ask for item with completion and execute the correspond command. `ess-sos` is a interface to `findFn` function in package `sos`. If package `sos` is not found, ask user for interactive install.

- ESS: New dynamic mode line indicator: Process status is automatically reflected in all mode-lines of associated with the process buffers. Particularly useful for displaying debug status of `ess-tracebug` and developer status of `ess-developer` in all associated buffers.
- ESS: New `ess-completing-read` mechanism: ESS uses `ido` completions whenever possible. Variable `ess-use-ido` controls whether to use `ido` completion or not. Active by default.
- ESS now supports `comint` fields for output and input detection. This feature is not used by default, but might be useful in the future.
- ESS[S]: New custom variable `inferior-ess-S-prompt` to customize prompt detection regular expression in the inferior ESS buffers. You can customize this variable to enhance `comint` navigation (`comint-previous-prompt` and `comint-next-prompt`) the inferior buffers.
- ESS[R]: Internal R completion retrieval (`ess-R-complete-object-name`) was rewritten and is faster now.
- ESS is using process plist to store process specific variables, as opposed to buffer local variables as it was using before. The use of buffer local variables to store process variables is discouraged.
- ESS: new functions to manipulate process plists: `ess-process-get` and `ess-process-set`.
- ESS: Internal process waiting mechanism was completely rewritten. ESS no more relies on prompt regular expressions for the prompt detection. The only requirement on the primary process prompt is to end in `>`. This could be overwritten by setting `inferior-ess-primary-prompt`.
- ESS[S], notably R: Saved command history: `ess-history-file` now accepts `t` (default), `nil`, or a file name. By setting it to `nil` no command line history is saved anymore. `ess-history-directory` now allows to have the history all saved in one “central” file.
- ESS[R]: more Roxygen improvements.
- ESS[R]: `C-c .` to set (indentation) style.
- ESS[R]: Functions with non-standard names (for example `'aaa-bbb:cc'`) are properly handled by font-lock and evaluation routines.
- ESS[R]: Several regexp bugs (described in `etc/R-ESS-bugs.el`) were fixed in `ess-get-words-from-vector` and `ess-command`.

## 1.9 Reporting Bugs

Please send bug reports, suggestions etc. to [ESS-bugs@r-project.org](mailto:ESS-bugs@r-project.org)

The easiest way to do this is within Emacs by typing

*M-x ess-submit-bug-report*

This also gives the maintainers valuable information about your installation which may help us to identify or even fix the bug.

If Emacs reports an error, backtraces can help us debug the problem. Type "M-x set-variable RET debug-on-error RET t RET". Then run the command that causes the error and you should see a *\*Backtrace\** buffer containing debug information; send us that buffer.

Note that comments, suggestions, words of praise and large cash donations are also more than welcome.

## 1.10 Mailing Lists

There is a mailing list for discussions and announcements relating to ESS. Join the list by sending an e-mail with "subscribe ess-help" (or "help") in the body to [ess-help-request@r-project.org](mailto:ess-help-request@r-project.org); contributions to the list may be mailed to [ess-help@r-project.org](mailto:ess-help@r-project.org). Rest assured, this is a fairly low-volume mailing list.

The purposes of the mailing list include

- helping users of ESS to get along with it.
- discussing aspects of using ESS on Emacs and XEmacs.
- suggestions for improvements.
- announcements of new releases of ESS.
- posting small patches to ESS.

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