
rg.el Documentation

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rg.el is an Emacs search package based on the [ripgrep](#) command line tool. It allows you to interactively create searches, doing automatic searches based on the editing context, refining and modifying search results and much more. It is also highly configurable to be able to fit different users' needs.

Throughout this manual this emacs package will be referred to as *rg* while the command line utility will be referred to as *ripgrep*.

If you are used to built-in Emacs `rgrep` command, transitioning to *rg* should be simple. *rg* provides a lot of extra features but the basics are similar.

The big benefit of using *ripgrep* instead of *grep* as a backend is speed. Especially when searching large source code repositories where *ripgrep* really shines. Please read [this blog post](#) for some speed comparisons with other tools.

1.1 Installation

This version of *rg* is supported on GNU Emacs 25.1 or later on Linux systems. It might work on older Emacsen and on other systems but such configurations are not tested. Patches for other OS:es are welcome.

MELPA

Packages are published on [MELPA Stable](#) and [MELPA](#). From within Emacs, run `M-x package-install [RET] rg [RET]` to install from those sources.

Enable default key bindings:

```
(rg-enable-default-bindings)
```

The above will enable the default key map under the default prefix key `C-c s`.

Manual

Releases can alternatively be downloaded from [GitHub](#) and installed manually. Put all elisp files in main directory in your load path and `require` the package in your init file.

```
(require 'rg)
(rg-enable-default-bindings)
```

You would also need to make sure all package requirements are met. For this version these are:

- **wgrep** 2.1.10
- **transient** 0.1.0
- **emacs** 25.1

`rg` is using autoloaded symbols which means it's also possible to defer loading if you have autoloading setup. That usually comes out of the box with `package-install`.

Lazy loading

For lazy loading you don't want to call directly into the package during startup. Use a setup similar to this instead:

```
(global-set-key (kbd "C-c s") #'rg-menu)
(with-eval-after-load 'rg
  ;; Your settings goes here.
)
```

If you don't want to use the transient menu interface, the following is needed to achieve lazy loading:

```
;; Workaround for emacs' lack of autoloaded keymaps.
;; This is essentially what use-package do.
(defun rg-autoload-keymap ()
  (interactive)
  (if (not (require 'rg nil t))
      (user-error (format "Cannot load rg"))
      (let ((key-vec (this-command-keys-vector)))
        (global-set-key key-vec rg-global-map)
        (setq unread-command-events
              (mapcar (lambda (ev) (cons t ev))
                      (listify-key-sequence key-vec))))))
(global-set-key (kbd "C-c s") #'rg-autoload-keymap)
(with-eval-after-load 'rg
  ;; Your settings goes here.
)
```

wgrep

This package use `wgrep` for editing capabilities in the `rg` results buffer. No setup is needed.

Interaction with the `ripgrep` configuration file

The `ripgrep` binary allows using a `configuration file` to set default values for command line flags. This package requires specific command line flags to function correctly and using a `ripgrep` configuration may conflict with these requirements. Therefore the configuration file is ignored by default. This can be changed by the `rg-ignore-ripgreprc` setting.

Note: Using the `ripgrep` configuration file may break functionality of this package if you are not careful.

1.2 Searching

Searching is done by invoking one of the different frontend commands. This package is built around recursive search based on three parameters; a single `directory`, `file type` filter, and a search `pattern`. These three parameters can interactively be selected or figured out automatically by the package, depending on which command that is used.

The underlying *ripgrep* binary has the file type filter concept built in. You have a high level of control over which files to search and which to ignore. This is partly what makes it so fast, ignoring uninteresting files.

In addition to the base parameters there are a lot of options that control how a search is done. These are typically selected from the *rg-menu* interface.

1.2.1 Case sensitivity

Considering case when searching is an important feature of any search tool. This package gives you a lot of control over how to handle case sensitive and case insensitive search. It can be forced to **on** or **off** and set to **smart case**. The latter is similar to the *ripgrep* `--smart-case` flag but is not using the flag directly. One thing to note about this is that the case insensitive setting controls the behavior when starting a new search. In the results buffer the setting is fixed to **on** or **off** but can be toggled easily with a key binding. See *rg-ignore-case* customization for the details of the configuration.

1.2.2 Interactive search

Two commands implements fully interactive search, where all the base parameters are selected from the mini buffer.

C-c s r (rg)

This command prompts for *query*, *file type* and *directory* and tries to suggest reasonable default values. The *query* string is interpreted as a regular expression. Default for *query* is the thing at point and for *directory* it is the current directory. If the type of the currently visited file is recognized, the corresponding *file type alias* is suggested as the *file type* parameter.

Invoking this command with the *universal argument* will trigger confirmation and potential modification of the *full command line* that will invoke the *ripgrep* binary.

C-c s t (rg-literal)

This command works in the same way as *rg* but interprets the *query* string literally and not as a regular expression.

Invoking this command with the *universal argument* will trigger confirmation and potential modification of the *full command line* that will invoke the *ripgrep* binary.

1.2.3 Project search

A common scenario is to search through a whole project while visiting a file in the project. This essentially means identifying the project root and use that as the top *directory* when invoking the *ripgrep* binary. *rg* supports several ways of identifying a project. Emacs' major project packages are supported including *projectile*, *find-file-in-project* and builtin *project.el*. If none of these are used, the fallback is Emacs' *vc-backend*.

C-c s p (rg-project)

Search in the current project. The *directory* is selected via one of Emacs' project packages while *query string* and *file type* are prompted for. The *query string* is interpreted as a regular expression.

1.2.4 Do what I mean

The **DWIM** family of search commands tries to be smart by figure out the search parameters from the context without prompting. Thanks to *ripgrep*'s speed, this allows for new ways of searching by invoking a *dwim* command and then *refine* the search from the results buffer.

These commands use the word (with the definition of word depending on context) under cursor as the *query* string. The *file type* parameter is taken from the type of the currently visited file. If the current file type can not be identified

all file types known to *ripgrep* are used. The fallback can be customized with *rg-default-alias-fallback*. The *directory* parameter varies between these commands.

M-x rg-dwim-project-dir

Do a **DWIM** search in the current *project*.

M-x rg-dwim-current-dir

Do a **DWIM** search in the current directory.

M-x rg-dwim-current-file

Do a **DWIM** search in the current file. The *current file* in this context is actually a file *pattern* exactly matching the current file name in a search starting from current directory. Most of the time this means a single file but if there are multiple files with the same name in a sub directory, those will be searched as well.

C-c s d (rg-dwim)

This command combines all the **DWIM** commands to one. The default search is in the *project dir*. With one *universal argument* *current directory* is used and with double *universal arguments* a *file search* is done.

1.2.5 File type aliases

File type aliases are used in *ripgrep* to filter out the files to search in. The *ripgrep* binary comes with a default set of aliases that can be extended or overridden from this package by customizing *rg-custom-type-aliases*.

An alias is a mapping between a name and a list of **glob patterns** matching the files of interest. Selecting an alias when searching is done with completing read of the defined aliases. It is also possible to enter a custom glob pattern if there is no suitable alias defined for the file type.

rg defines some internal aliases:

Name	Meaning
all	all defined types including <i>rg-custom-type-aliases</i>
everything	all files. No filtering on type is done.
custom	used internally in this package for mapping custom glob patterns.

Warning: Do not use any of the internal aliases in *rg-custom-type-aliases*. That would interfere with the package internal usage.

1.2.6 The menu

The global *prefix key* may be bound to a transient prefix command, which in normal words mean that the key binding will popup a menu. This package is using the same **popup menu backend** as the *magit* package. If you are familiar with *magit* this should feels like home.

The menu is mostly interesting when you want to give specific command line flags to the *ripgrep* binary. When you just want to do a quick search based on the defaults the menu basically acts as a normal keymap.

Pressing the *rg-menu prefix key* will popup the menu where command line flags can be selected before triggering the wanted search function. The menu can be customized via the transient API as usual. This package contains some shortcuts to directly add a new command to the menu when defining the command via the *rg-define-search* macro.

```
(rg-define-search rg-word
  :format literal
  :flags ("--word-regexp")
  :menu ("Custom" "w" "Word"))
```

The `:menu` keyword in the above invocation will trigger insertion of a new menu item bound to key `w` with description **Word**. The new menu item will be put under the **Custom** group. This group is not available in the original menu so it will be created.

The menu can be triggered from the *results buffer* with the `m` key. The commands in the menu differs, depending on from where it's triggered but the available options are the same. The menu does not show all options by default. The visible options can be controlled by the transient suffix levels documented [here](#).

1.3 Results buffer

The results of a search is shown in the results buffer. This buffer displays search parameters, the full command line and the output of the *ripgrep* binary. It supports basic navigation between search results editing of the file contents directly from the search buffer and also modification of the current search. The results buffer is a modified *compilation* buffer and some key bindings and functionality is inherited from the parent and from *grep mode*.

1.3.1 Navigation

Navigation works mostly as in *grep/compilation* buffers.

M-n (compilation-next-error)

Move to next line with a match.

M-p (compilation-previous-error)

Move to previous line with a match.

n (next-error-no-select)

Move to next line with a match, show that file in other buffer and highlight the match.

p (previous-error-no-select)

Move to previous line with a match, show that file in other buffer and highlight the match.

M-N (rg-next-file)

Move to next file header if the results is grouped under a file header (See *rg-group-result*).

M-P (rg-prev-file)

Move to previous file header if the results is grouped under a file header (See *rg-group-result*).

} (compilation-next-file)

Move first match in previous file.

{ (compilation-previous-file)

Move last match in previous file.

RET (compile-goto-error)

Visit match in file.

1.3.2 Refine search

From the results buffer it's easy to change the search parameters. Some bindings toggle a flag while others allow you to interactively change the *base parameters*.

- d** (**rg-rerun-change-dir**)
Interactively change search *directory*.
- f** (**rg-rerun-change-files**)
Interactively change searched *file types*.
- t** (**rg-rerun-change-literal**)
Interactively change *search string* interpret the string literally.
- r** (**rg-rerun-change-regexp**)
Interactively change *search string* interpret the string as a regular expression.

Tip: `rg-rerun-change-regexp` and `rg-rerun-change-literal` are used for switching between regular expression and literal search. So for quick switching between search modes with the same search string, just press the respective key and then RET.

- g** (**rg-recompile**)
Rerun the current search without changing any parameters.
- c** (**rg-rerun-toggle-case**)
Toggle case sensitivity of search. The state of the flag is shown in the **[case]** header field.
- i** (**rg-rerun-toggle-ignore**)
Toggle if ignore files are respected. The state of the flag is shown in the **[ign]** header field.

Tip: It is possible to create and bind your own toggle flags with the macro `rg-define-toggle`.

- m** (**rg-menu**)
Fire up *the menu* for full access to options and flags.

1.3.3 Full command line search

Some search commands (See `rg` or `rg-literal`) allow you to edit the final command line before invoking the search by giving a *universal argument*. This can be used to invoke features of the `ripgrep` binary that is not supported in this package's interface. This could be specific flags, searching in multiple directories etc.

Note: Using full command line search will disable refinement of the search from the result buffer.

1.3.4 History navigation

Each search result is stored in the search history, which is a per results buffer property. History can be navigated back and forward, the forward history is cleared when a new search is done.

- C-c <** (**rg-back-history**)
Navigate back in history.
- C-c >** (**rg-forward-history**)
Navigate forward in history.

Tip: The key bindings here are slightly inconvenient so invoking this via *the menu* by pressing `m b` and `m w` is more ergonomic.

1.3.5 Edit and apply (wgrep)

The results buffer supports inline editing via the `wgrep` package. This is setup automatically when `rg` is loaded.

e (wgrep-change-to-wgrep-mode)

Make the search results editable by enabling `wgrep` mode. When done press `C-c C-c` to commit your changes to the underlying files or `C-c C-k` to drop the changes.

1.4 Search management

The result buffer is named `*rg*` and `rg` reuse the same result buffer for new searches. If you want to store a search while continuing doing new searches there are two ways of doing that.

s (rg-save-search)

Save the search buffer by renaming it to a unique new name. This is available both outside and inside a result buffer. Outside of the result buffer it's bound to `C-c s`.

If you want to keep all search buffers until manually killed you can use this snippet in your init file.

```
(defadvice rg-run (before rg-run-before activate)
  (rg-save-search))
```

S (rg-save-search-as-name)

Save the search buffer and interactively give it a specific name. This is available both outside and inside a result buffer. Outside of the result buffer it's bound to `C-c s S`.

The default buffer name can be customized with `rg-buffer-name`. This setting considers dir local variables and it's even possible to use a function to get a really dynamic setup.

Having a lot of search buffers floating around can easily get messy. To help keeping this under control there is a search manager. The manager is simply a modified `ibuffer` that lists all the results buffers, shows some data about the searches and make it possible to kill of some unused etc.

L (rg-list-searches)

Open the search manager. This is available both in result buffer and globally bound to `C-c s l`.

C-c s k (rg-kill-saved-searches)

Kill all saved searches except for the one that matches `rg-buffer-name`. This is available both in result buffer and globally bound to `C-c s k`.

Warning: If you have a dynamic `rg-buffer-name` setup, only one buffer that matches your current criteria (dir locals or project for instance) will be kept. So be careful when killing saved searches to avoid losing important search results.

2.1 Customization

Customization is done via the Emacs customization system. The group `rg` is the main group of the package.

```
M-x customize-group [RET] rg [RET]
```

rg-executable [(executable-find "rg")]

The *ripgrep* executable to use. Could be an absolute path or just the base name if the executable is in the path. The default is using `executable-find` to locate the command. If you want to use this package with tramp it might be better to set it to just “`rg`” in order to let the OS find the binary where it’s invoked.

rg-custom-type-aliases [(("gyp" . "*.gyp *.gypi"))]

An association list that maps file type aliases to a space delimited string with file globs. These are combined with the *ripgrep* builtin file aliases.

Example:

```
(setq rg-custom-type-aliases
      '(("foo" . "*.foo *.bar")
        ("baz" . "*.baz *.qux")))
```

You may also add lambdas to `rg-custom-type-aliases` to add aliases dynamically based on mode, directory, project, etc.

```
(add-to-list
 'rg-custom-type-aliases
 (lambda ()
   (when (in-frontend-app)
     (cons "ui" "*.js *.hbs *.json"))))
```

rg-default-alias-fallback ["all"]

This setting controls the default alias used when no alias can be recognized for the current buffer. `all` or `everything` are reasonable values for this variable.

rg-command-line-flags [*nil*]

A list of command line flags that will be appended to the *ripgrep* command line. Must either be a list of flags or a function that returns a list of flags.

rg-group-result [*t*]

Controls the layout of the results buffer. If non *nil*, each file name is displayed once and matches are grouped under that filename instead of repeating the filename on each match. This is essentially the layout of the *--no-heading ripgrep* command line flag.

rg-show-columns [*nil*]

Controls if column numbers are used in the search result.

rg-ignore-case [*case-fold-search*]

Setting that controls if case sensitive search is made or not. It can essentially be **on**, **off** or **smart**. The **smart** setting will trigger an analyze of the search string and if it's all lower case, the search will be case *insensitive*, otherwise it will be case *sensitive*. The following values are valid:

- **case-fold-search** - A non *nil* value of *case-fold-search* will trigger smart case behavior.
- **smart** - Smart case behavior.
- **force** - Always ignore case.
- **nil** - Always consider case.

rg-hide-command [*t*]

Hide most of command line by default. This is enabled by default and can be set to *nil* to show full command line. This can be toggled in the results buffer by clicking on the command line.

rg-keymap-prefix ["*C-c s*"]

This variable sets the default prefix used for the global key bindings. Note that *rg-enable-default-bindings* needs to be invoked for the bindings to be enabled.

rg-use-transient-menu [*t*]

Controls whether *rg-menu* will be used by default or not. It's also possible to enable the menu explicitly with

```
(rg-enable-menu)
```

rg-show-header [*t*]

Controls if the search info header is shown in the result buffer. This is enabled by default but can be disabled by setting this variable to *nil*.

rg-buffer-name ["*rg*"]

Controls the name of the results buffer. It may be *string* or *function*. This name will be surrounded by *** to yield the final buffer name so if this setting is *foo* the buffer name will be **foo**. One useful case of using it is to have separate result buffers per project. One can set this variable in 'dir-locals' file or set it to function.

Example, this function will set results buffer name based on 'project-current':

```
(defun my-rg-buffer-name ()  
  (let ((p (project-current)))  
    (if p  
      (format "rg %s" (abbreviate-file-name (cdr p)))  
      "rg"))))
```

rg-ignore-ripgrepc [*t*]

Controls if the *ripgrepc* file should be ignored or not. If *nil*, the config file will be used, otherwise it will be ignored. The default is to ignore this file in order to avoid that conflicting settings have impact on this package's behavior. Setting this to *nil* may affect core functionality of this package. Especially changing colors can affect parsing of the output and result in a broken results buffer.

2.1.1 Position numbers alignment

When operating *rg* in grouped output mode (*rg-group-result* is non nil), it's possible to control how the line and column numbers are displayed in the result buffer.

Example settings:

```
(setq rg-align-position-numbers t)
(setq rg-align-line-number-field-length 3)
(setq rg-align-column-number-field-length 3)
(setq rg-align-line-column-separator "#")
(setq rg-align-position-content-separator "|")
```

Will yield the following format:

```
File: matched_file.foo
  1#  2|match1
888# 10|match2
```

rg-align-position-numbers [t]

Setting this to *t* will align line and column numbers in columns padded with white space.

rg-align-line-number-field-length [4]

Defines the length of the line number field.

rg-align-column-number-field-length [3]

Defines the length of the column number field.

rg-align-line-column-separator [" "]

Separator string used between line and column numbers. *nil* means use default separator from *ripgrep*.

rg-align-position-content-separator [" "]

Separator string used between the position numbers and matched content. *nil* means use default separator from *ripgrep*.

2.2 Faces

All faces are in the subgroup *rg-face* of the main group *rg*.

```
M-x customize-group [RET] rg-face [RET]
```

2.2.1 Results buffer

rg-match-face [match]

Face used to highlight matches in result.

rg-error-face [compilation-error]

Face used to highlight errors when invoking *ripgrep*.

rg-context-face [shadow]

Face used to highlight context lines in *ripgrep* output when *--context-lines* flag is used.

rg-info-face [compilation-info]

Face used to highlight general info in results buffer. For instance the number of matches found.

rg-warning-face [compilation-warning]

Face used to highlight warnings in the *ripgrep* output.

rg-filename-face [**rg-info-face**]

Face used to highlight filenames in the output.

rg-file-tag-face [**rg-info-face**]

Face used for the `File:` tag in grouped results output.

rg-line-number-face [**compilation-line-number**]

Face used on line numbers.

rg-column-number-face [**compilation-column-number**]

Face used on column numbers.

rg-match-position-face [**default**]

Face added to file positions. This is the start of a matching line and depending on configuration may be, file name, column number and line number.

2.2.2 Header line

rg-toggle-on-face [**rg-file-tag-face**]

Face used for flags that are toggled on.

rg-toggle-off-face [**rg-error-face**]

Face used for flags that are toggled off.

rg-literal-face [**rg-filename-face**]

Face used the on the `literal` marker in the header line.

rg-regexp-face [**compilation-line-number**]

Face used the on the `regexp` marker in the header line.

2.3 Configuration functions

(**rg-enable-default-bindings** *&optional, prefix*)

Enable the default keyboard bindings for the package with prefix key. If `rg-use-transient-menu` is on this will enable the menu instead of activating the global bindings. If `prefix` is not provided `rg-keymap-prefix` will be used.

(**rg-enable-menu** *&optional, prefix*)

Enable the `rg-menu` with prefix key. This bypass `rg-use-transient-menu` setting. If `prefix` is not provided `rg-keymap-prefix` will be used.

(**rg-use-old-defaults**)

This function is provided to keep backwards compatibility with versions older than 2.0.0. In this version default settings as well as key bindings changed and to bring back the old defaults call this function in your init file.

2.4 Configuration macros

(**rg-define-toggle** *flag, &optional, key, default*)

This is a macro that can be used to define custom `ripgrep` flag toggling functions in the result buffer. The macro takes the flag (and potential value) as an argument and optionally binds the toggle function to a key. If `default` is non nil the flag is used by default.

The function defined by this macro will be named as the flag name stripped with leading dashes and prefixed with `rg-custom-toggle-flag-`.

```
(rg-define-toggle "--uu" "I" t)
```

Creates a function named `rg-custom-toggle-flag-uu` that is on by default and bound to `I` in `rg` result buffer.

```
(rg-define-toggle "--context 3" (kbd "C-c c"))
```

Creates a function named `rg-custom-toggle-flag-context` that is off by default and bound to `C-c c` in `rg` result buffer.

(rg-define-search name, &rest, args)

This macro can be used to define custom search functions in a declarative style. Default implementations for common behavior is available and custom forms can also be used.

It optionally starts with a string that is used as the docstring for the defined function. The rest of the arguments contain key value pairs according to the specification below. All keys are optional with specified default if left out.

- **:query** - Method for retrieving the search string. Allowed values are `point` which means extract thing at point and `ask` which means prompt the user for a string. Any form that evaluates to a string is allowed. Default is `ask`.
- **:format** - Specifies if `:query` is interpreted literally (`literal`) or as a regexp (`regexp`). If it is a form, eg. `(not current-prefix-arg)`, and is non-nil the `:query` is interpreted literally, otherwise as a regexp. Default is `regexp`.
- **:files** - Form that evaluates to a file alias or custom file glob. `current` means extract alias from current buffer file name, `ask` will prompt the user. Default is `ask`.
- **:dir** - Root search directory. Allowed values are `ask` for user prompt, `current` for current dir and `project` for project root. Any form that evaluates to a directory string is also allowed. Default is `ask`.
- **:confirm** - `never`, `always`, or `prefix` are allowed values. Specifies if the the final search command line string can be modified and confirmed the user. Default is `never`.
- **:flags** - `ask` or a list of command line flags that will be used when invoking the search.
- **:menu** - Bind the command into `rg-menu`. Must be a list with three items in it. The first item is the description of the group in witch the new command will appear. If the group does not exist a new will be created. The second item is the key binding for this new command (ether a key vector or a key description string) and the third item is the description of the command that will appear in the menu.

Examples:

```
(rg-define-search search-everything-at-home
  "Search files including hidden in home directory"
  :query ask
  :format literal
  :files "everything"
  :flags ("--hidden")
  :dir (getenv "HOME")
  :menu ("Search" "h" "Home"))

(rg-define-search rg-emacs
  "Search the emacs lisp source code."
  :dir "/usr/share/emacs/25.2/lisp/"
  :flags '("-z")
  :files "*.el,el.gz"
  :menu ("Custom" "L" "lisp"))
```

2.5 Customizing the menu

Please refer to the [transient](#) documentation for customizing the menu.

Contributions are very welcome. Development is done in the [GitHub repository](#). If you find a bug, please report it in the [issue tracker](#).

3.1 Pull requests

If you want to submit a patch, please submit a [GitHub pull request](#). If you want to submit any larger code changes, please create an issue first for discussion. Some features does not fit well into this package and there is also good to agree on the general design before doing any major work.

The minimum requirements for a pull request to be accepted is that all existing tests pass and test coverage should not decrease. Often a patch also needs additional tests, new/changed documentation etc.

Don't strive to submit a perfect pull request directly. It's often better to submit something simple that shows the main direction of the new code in order to discuss the best way to proceed and what additions are needed.

3.2 Tests

[Cask](#) is used for testing. The tests are written using the Emacs built in ERT framework and executed with [ert runner](#). There are also compilation tests, style check, package verification etc.

3.2.1 Setup

- [Install cask](#)
- Install all developer dependencies:

```
make deps
```

3.2.2 Running

- Run the whole test suite:

```
make test
```

- Run only the unit/integration tests:

```
make ert-test
```

- Manually test the package with Emacs:

```
cask emacs -Q -L . --eval="(progn (require 'rg) (enable-default-bindings))"
```

3.3 Documentation

The documentation is written in org mode. The export target is *restructured text* suitable for the *Sphinx* documentation generator. Sphinx is used to export the output from org mode to info and HTML documentation. The resulting .rst files are used for the online documentation on <https://readthedocs.io>.

The ReadTheDocs documentation is generated after committing to the main repository but the info manual needs to be created locally and submitted as part of a documentation patch. It's advisable to build both locally and verify the output to make sure the changes looks OK.

3.3.1 Setup

- Install Sphinx

```
apt-get install python3-sphinx
```

3.3.2 Building

- HTML documentation

```
make html
```

Open `docs/rst/_build/html/index.html` in a browser.

- Info documentation

```
make info
```

To view in emacs:

```
C-u M-x info [RET]
```

Then select the `docs/rst/_build/info/rgel.info` file.

3.3.3 Create a patch

- Edit the org files in `docs` directory.
- When everything looks good in both HTML and info.

```
make info
```

- Commit both the changed org files and info file.
- Push and create PR.

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```
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Copyright (C) <year> <name of author>
```

```
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```
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```

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