Readline Ninja Skills

Jack Rosenthal

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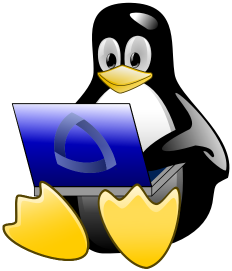

Colorado School of Mines
Linux Users Group

Readline

- A library for interactive line editing that your shell probably uses.
- Responsible for things like tab completion, history expansion, and all of those useful keystrokes
- Readline saves you keystrokes.
- Some readline things can make you look like a total ninja.
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History

Readline can track your history, most shells let you use the `history` builtin to view your history.
You can navigate your history using the up and down keys.

Tab completion

Most of us already know what this and would die without it.

Event Designators

- ! - begin history expansion
- !! - refer to the last command
- !*n* - refer to the *n*-th command in history
- !−*n* - refer to the current command minus *n*
- !# - refer to the current command you are typing
- !*search* - refer to the last commmand that starts with *search*
- !?*search*? - refer to the last command with *search* anywhere in the command

Examples:

- sudo !! - run the last command with sudo in front
- !grep - run the last command you typed beginning with grep

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Word Designators

Often times you will want only part of a command, so you can use word designators to select which parts you want. Follow an event designator with a colon (:) and then a word designator.

- :*n* - select argument *n* (zero indexed)
- :*n*-*m* - select arguments *n* through *m*
- :$ - select the last argument (think of a regex)
- :* - select all arguments, omitting the command name (equivalent to :1-$)
- :% - select the argument that matches ?*search*?

Examples:

- cd !!:1 - cd to the first argument of the last command.
- vim !-2:$ - edit the file that is the last argument of two commands ago

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Modifiers let you chop up the history expansion in ways that you like. You can chain any amount of modifiers that you would like onto your expansion.

- `:r` - Chop off the extension of a filename
- `:h` - Remove the filename component, leaving only the directory (think of head)
- `:t` - Remove the directory component, leaving only the filename (think of tail)
- `:q` - Quote each of the arguments
- `:s/`*search*`/`*replace*`/` - `sed` style substitution
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Examples:

- `mv important.png !#:1:r.gif` - rename `important.png` to `important.gif`
- `touch mydir/file.txt`
- `cd !$:h`

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Editing Modes

Readline provides editing modes similar to `vi` and `emacs`. Learn one and learn to love it. Most shells and programs have `emacs` as the default.

History Incremental Search

`<C-r>` (`vi: <Esc>/`) brings you to an search of your history. `<C-s>` will reverse the direction of your search (You may need to `stty -ixon`).

C/C++ Readline Library

```
#include <stdio.h>
#include <readline/readline.h>
#include <readline/history.h>

char * readline(const char *prompt);
```

Allocates memory to read a line, reads it from standard input (displaying `prompt` as the prompt line). Returns the line you read. You really should `free` the memory it allocated.

Using History Features

```
void using_history(void);
```

Must be called before using history features.

```
int read_history(const char *filename);
int write_history(const char *filename);
```

For reading/writing saved history. Returns non-zero on failure and sets `errno`.

```
void add_history(const char *line);
```

Add a line to the history.

```
HIST_ENTRY ** histlst = history_list();
for (int i = 1; *histlst; i++, histlst++)
    printf("%d %s\n", i, (*histlst)->line);
```

List history.

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void using_history(void);
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History Expansion (for free!)

```
int history_expand(char *string, char **output);
```

Expand string, placing the result into output, a pointer to a string.
Returns:

0	If no expansions took place
1	If expansions did take place
-1	If there was an error in expansion
2	If the line should be displayed, but not executed (`:p`)

If an error occurred in expansion, then output contains a descriptive error message.

A Complete Example

```c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/wait.h>
#include <readline/readline.h>
#include <readline/history.h>
int main(void) {
    char *line = NULL, *expn = NULL;
    int status;
    using_history();
    for (;;) {
        free(line), free(expn);
        line = readline("prompt> ");
        if (!line) return 0; /* ^D to exit */
        int expn_result = history_expand(line, &expn);
        if (expn_result) puts(expn);
        add_history(expn);
        if (expn_result == 0 || expn_result == 1) {
            int pid = fork();
            if (pid < 0) return 1;
            if (pid == 0) {
                char ** arg = history_tokenize(expn);
                execvp(*arg, arg);
                return 1;
            }
            waitpid(pid, &status, 0);
        }}}
```

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2. `man 3 history`
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