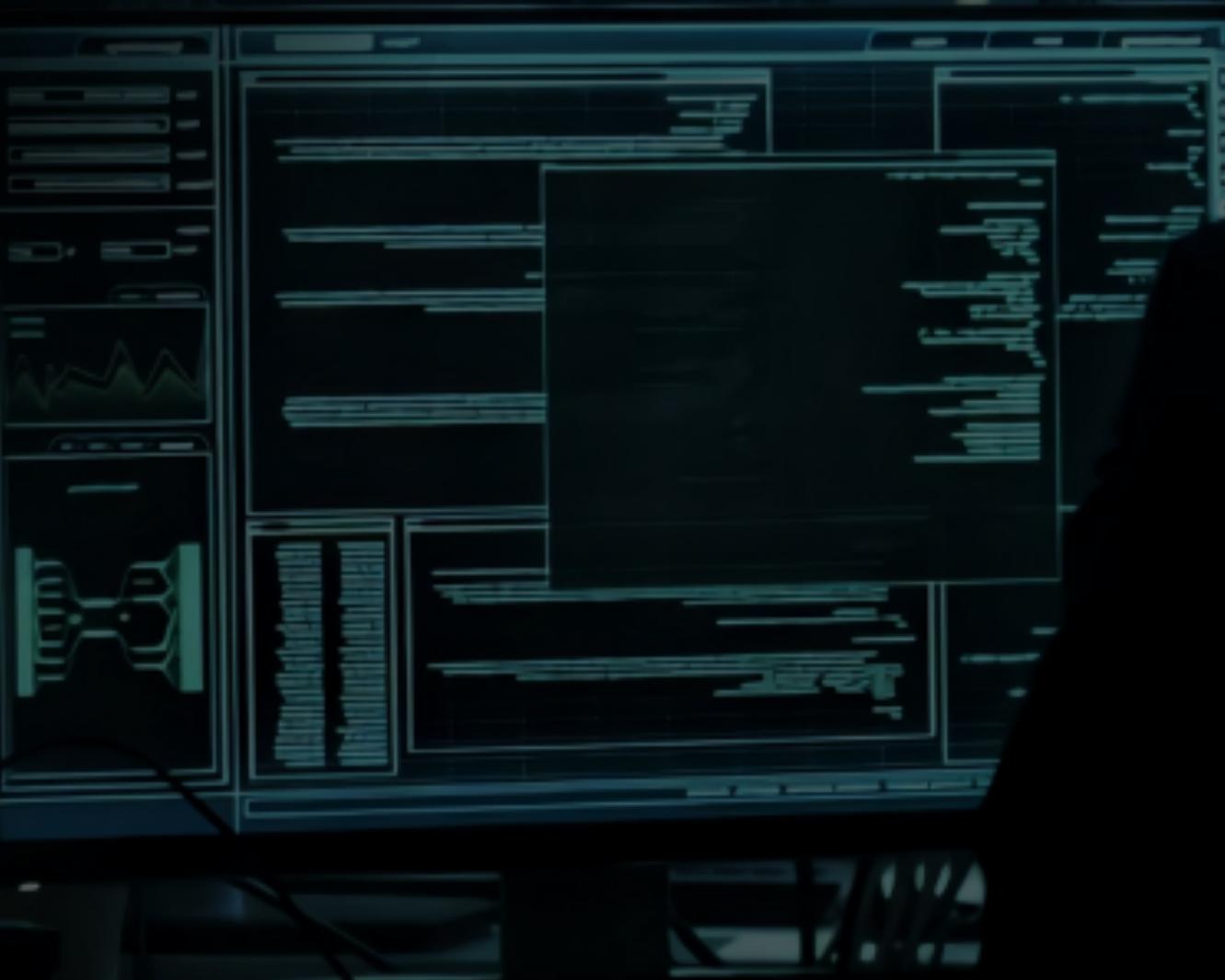




# EXPLORING LINUX SHELL HISTORY AND HISTCONTROL



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# The Primary UI: The Shell

- On Linux the primary user interface is the shell, most commonly bash.
- Via the shell users can navigate the filesystem, manipulate files, and execute programs.
- A very useful feature of the shell is its history, which retains a list of commands the user ran, even between login sessions and surviving reboots.
- Understanding shell history is crucial for efficiently using the shell.
- The history is valuable for troubleshooting and investigating security breeches.

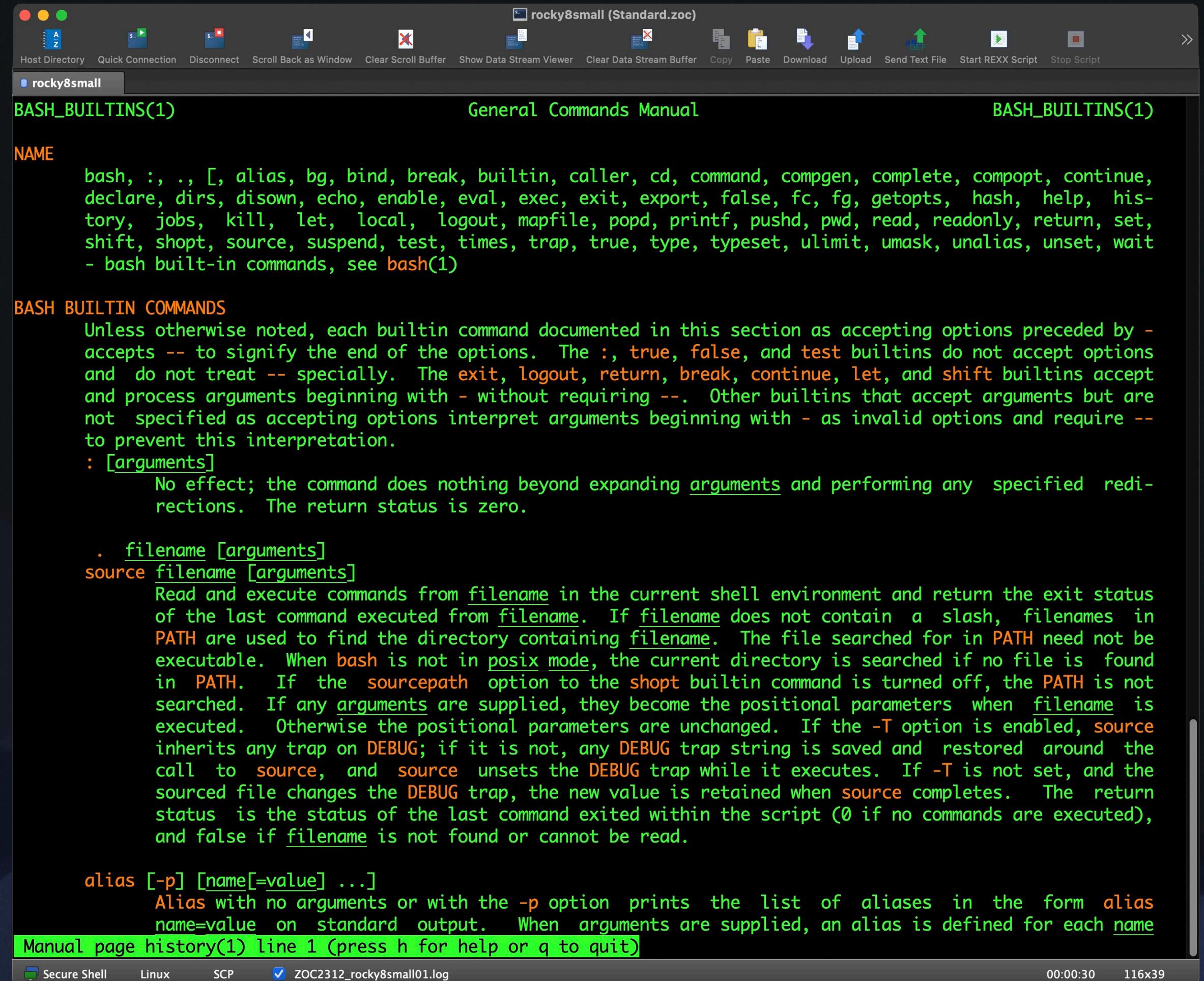
```
top - 14:30:58 up 4 days, 1:47, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 200 total, 2 running, 198 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.2 us, 0.2 sy, 0.0 ni, 99.5 id, 0.0 wa, 0.0 hi, 0.2 si, 0.0 st
MiB Mem : 1765.7 total, 1013.4 free, 231.5 used, 520.8 buff/cache
MiB Swap: 1640.0 total, 1640.0 free, 0.0 used, 1342.9 avail Mem

PID USER      PR  NI    VIRT   RES   SHR S %CPU %MEM TIME+ COMMAND
 952 root      20   0  693036 33000 16520 S  0.3  1.8 8:00.95 tuned
    1 root      20   0 175068 13512  9036 S  0.0  0.7 0:02.99 systemd
    2 root      20   0      0   0     0 S  0.0  0.0 0:00.08 kthreadd
    3 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 rCU_gp
    4 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 rCU_par_gp
    5 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 slub_flushwq
    7 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 kworker/0:0H-events_highpri
   10 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 mm_percpu_wq
   11 root      20   0      0   0     0 S  0.0  0.0 0:00.00 rCU_tasks_rude_
   12 root      20   0      0   0     0 S  0.0  0.0 0:00.00 rCU_tasks_trace
   13 root      20   0      0   0     0 S  0.0  0.0 0:00.14 ksoftirqd/0
   14 root      20   0      0   0     0 I  0.0  0.0 0:18.07 rCU_sched
   15 root      rt   0      0   0     0 S  0.0  0.0 0:00.00 migration/0
   16 root      rt   0      0   0     0 S  0.0  0.0 0:00.05 watchdog/0
   17 root      20   0      0   0     0 S  0.0  0.0 0:00.00 cpuhp/0
   18 root      20   0      0   0     0 S  0.0  0.0 0:00.00 cpuhp/1
   19 root      rt   0      0   0     0 S  0.0  0.0 0:00.39 watchdog/1
   20 root      rt   0      0   0     0 S  0.0  0.0 0:00.00 migration/1
   21 root      20   0      0   0     0 S  0.0  0.0 0:00.06 ksoftirqd/1
   23 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 kworker/1:0H-events_highpri
   26 root      20   0      0   0     0 S  0.0  0.0 0:00.00 kdevtmpfs
   27 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 netns
   28 root      20   0      0   0     0 S  0.0  0.0 0:00.00 kaudited
   29 root      20   0      0   0     0 S  0.0  0.0 0:00.47 khungtaskd
   30 root      20   0      0   0     0 S  0.0  0.0 0:00.00 oom_reaper
   31 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 writeback
   32 root      20   0      0   0     0 S  0.0  0.0 0:00.00 kcompactd0
   33 root      25   5      0   0     0 S  0.0  0.0 0:00.00 ksmd
   34 root      39   19      0   0     0 S  0.0  0.0 0:01.63 khugepaged
   35 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 crypto
   36 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 kintegrityd
   37 root      0 -20      0   0     0 I  0.0  0.0 0:00.00 kblockd
```



# Evolution of Shell History

- The shell history feature dates back to the early days of UNIX operating systems.
- Originally, it was found in `~/.history`.
- As bash and other more advanced shells became popular that facilitated users navigating through, searching, and manipulating the history.
- Nowadays, it's most commonly found in `~/.bash_history`.
- Documentation for the `history` command is found in the bash man page.



The screenshot shows a terminal window titled "rocky8small (Standard.zoc)" with the command "history" selected. The window displays the "General Commands Manual" for "BASH\_BUILTINS(1)". The "NAME" section lists various built-in commands like bash, :, alias, bg, bind, break, builtin, caller, cd, command, compgen, complete, compopt, continue, declare, dirs, disown, echo, enable, eval, exec, exit, export, false, fc, fg, getopt, hash, help, history, jobs, kill, let, local, logout, mapfile, popd, printf, pushd, pwd, read, readonly, return, set, shift, shopt, source, suspend, test, times, trap, true, type, typeset, ulimit, umask, unalias, unset, wait, and bash built-in commands. The "BASIC BUILTIN COMMANDS" section provides details on the : command, stating it has no effect and returns zero. It also describes the . and source commands for reading and executing commands from files. The "alias" command is also documented, explaining its purpose of defining aliases. The bottom status bar shows "Secure Shell", "Linux", "SCP", and the log file "ZOC2312\_rocky8small01.log".



# HISTCONTROL Values

- The HISTCONTROL variable enhances control and customization of the bash history. Common values include:
  - ignorespace: Commands starting with a space character are not saved to the history. This is useful for avoiding the storage of sensitive information like passwords. It can also be used by bad actors to cover their tracks!
  - ignoredups: This prevents duplicate commands from being stored in the history.
  - ignoreboth: This is a combination of ignorespace and ignoredups. It ignores commands that start with a space and eliminates duplicates.
  - erasedups: Consecutive duplicate commands are removed from the history.
  - ignoreerr: Commands that fail (exit with a non-zero status) are not saved.



# Configuring HISTCONTROL

- To set the HISTCONTROL variable use the export command, like so:
  - \$ export HISTCONTROL=ignoreboth
- That will ignore commands starting with a space and duplicate commands.
- To have the change persist across login sessions and reboots, add this line to either your ~/.bashrc or ~/.bash\_profile using a text editor.



# Navigating History

- To display the history, do:
  - `$ history`
- To recall previous items use the up and down arrows.
- Other options:
  - `$ !n`: Re-executes the command with the specified number 'n' from the history.
  - `$ !!`: Re-executes the last command.
  - `$ !string`: Re-executes the most recent command that starts with 'string'.
  - `$ Ctrl+R`: Initiates a reverse search through the history, allowing you to search for and execute a command that matches the entered string.
- By combining these features, users can make their command-line sessions more productive and secure.



# Conclusion

- Understanding the history mechanism and utilizing features like HISTCONTROL in the Linux shell can significantly enhance productivity and streamline command-line workflows.
- Both experienced Linux users and n00bs will find that mastering these tools will make your interactions with the command line more efficient and enjoyable.
- Experiment with different settings, explore history navigation techniques, and tailor your shell experience to suit your preferences and requirements.



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