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Bash 4 - a rough overview

The Bash Hackers Wiki

This wiki is intended to hold documentation of any kind about GNU Bash. The main motivation was to provide *human-readable documentation* and information so users aren't forced to read every bit of the Bash manpage - which can be difficult to understand. However, the docs here are **not** meant as a newbie tutorial.

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What would YOU like to see here? (outdated and locked, please use the discussions)

Stranger! Feel free to register (http://wiki.bash-hackers.org/start&do=register) and comment or edit the contents. There is a Bash Hackers Wiki needs love page that lists some things to do. The registration is only there to prevent SPAM.

Scripting and general information

- Bash v4 - a rough overview (unmaintained, since Bash 4 is more or less standard)
- Scripting with style – an assorted collection of style and optic hints
- The basics of shell scripting
- Beginner Mistakes
- Bash's behaviour
- Handling positional parameters
- Bash and the process tree
- Obsolete and deprecated syntax
- Portability talk
- Debugging a script
- Terminal codes (ANSI/VT100) introduction

- tutoriallist

Code snippets

There is a section that holds small code snippets.

See also some Bash source code excerpts.

How to....

Doing specific tasks: concepts, methods, ideas:

- Simple locking (against parallel run)
- Rudimentary config files for your scripts
- Editing files with ed(1)
- Collapsing Functions
- Illustrated Redirection Tutorial
- Calculate with dc(1)
- Introduction to pax - the POSIX archiver
- Small getopts tutorial (*under construction!*)
- Dissect a bad oneliner An example of a bad oneliner, breakdown and fix (by `kojoro`)
- Write tests for ./your-script.sh by using bashtest util

Bash syntax and operations

- Bash features overview by version
- Basic grammar rules
- Quoting and character escaping
- Parsing and execution
- Some words about words...
- Patterns and pattern matching
- Arithmetic expressions
- List of shell options
- Redirection
- Special parameters and shell variables
- Arrays

Compound commands

Compound commands overview

Grouping

`{ …; }`	command grouping

Expansions and substitutions

Introduction to expansions and substitutions

`{A,B,C}` `{A..C}`	Brace expansion
`~/` `~root/`	Tilde expansion

Compound commands overview

Grouping

`( … )`	command grouping in a subshell

Conditionals

`[[ ... ]]`	conditional expression
`if …; then …; fi`	conditional branching
`case … esac`	pattern-based branching

Loops

`for word in …; do …; done`	classic for-loop
`for ((x=1; x<=10; x++)); do ...; done`	C-style for-loop
`while …; do …; done`	while loop
`until …; do …; done`	until loop

Misc

`(( ... ))`	arithmetic evaluation
`select word in …; do …; done`	user selections

Introduction to expansions and substitutions

`$FOO` `${BAR%.mp3}`	Parameter expansion
`` `command` `` `$(command)`	Command substitution
`<(command) > (command)`	Process substitution
`$((1 + 2 + 3))` `$[4 + 5 + 6]`	Arithmetic expansion
`Hello <---> Word!`	Word splitting
`/data/*-av/*.mp?`	Pathname expansion

Builtin Commands

This is a selection of builtin commands and command-like keywords, loosely arranged by their common uses. These are provided directly by the shell, rather than invoked as standalone external commands.

Declaration commands

	Commands that set and query attributes/types, and manipulate simple datastructures.	Alt	T
declare	Display or set shell variables or functions along with attributes.	`typeset`	b
export	Display or set shell variables, also giving them the export attribute.	`typeset -x`	sp b
eval	Evaluate arguments as shell code.	-	sp b
local	Declare variables as having function local scope.	-	b
readonly	Mark variables or functions as read-only.	`typeset -r`	sp b
unset	Unset variables and functions.	-	sp b
shift	Shift positional parameters	-	sp b

I/O		Alt	T
	Commands for reading/parsing input, or producing/formatting output of standard streams.		

Control flow and data processing

	Commands that operate on data and/or affect control flow.	Alt	Type
colon	"true" null command.	true	special builtin
dot	Source external files.	source	special builtin
false	Fail at doing nothing.	-	builtin
continue / break	continue with or break out of loops.	-	special builtin
let	Arithmetic evaluation simple command.	-	builtin
return	Return from a function with a specified exit status.	-	special builtin
[	The classic `test` simple command.	test	builtin

Process and Job control		Alt	Type
	Commands related to jobs, signals, process groups, subshells.		
exec	Replace the current shell process or set redirections.	-	special builtin
exit	Exit the shell.	-	special builtin
kill	Send a signal to specified process(es)	-	builtin

coproc	Co-processes: Run a command in the background with pipes for reading / writing its standard streams.	-	key
echo	Create output from arguments.	-	b
mapfile	Read lines of input into an array.	readarray	b
printf	"advanced echo ."	-	b
read	Read input into variables or arrays, or split strings into fields using delimiters.	-	b

Control flow and data processing

Commands that operate on data and/or affect control flow.		Alt	Type
trap	Set signal handlers or output the current handlers.	-	special builtin
times	Display process times.	-	special builtin
wait	Wait for background jobs and asynchronous lists.	-	builtin
		Alt	**Type**

Configuration and Debugging	**Alt**	**T**
Commands that modify shell behavior, change special options, assist in debugging.		
caller Identify/print execution frames.	-	b
set Set the positional parameters and/or set options that affect shell behaviour.	-	sp b

shopt	set/get some bash-specific shell options.	-	b

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Dictionary

A list of expressions, words, and their meanings is here.

Links

Official Bash links

- Chet Ramey's Bash page (http://tiswww.case.edu/php/chet/bash/bashtop.html) and its FAQ (http://tiswww.case.edu/php/chet/bash/FAQ).
- GNU Bash software page (http://www.gnu.org/software/bash/)
- Official Bash mailing lists:
  - **Bug reports**: bug-bash@gnu.org (mailto:bug-bash@gnu.org) (archives (http://mail.gnu.org/pipermail/bug-bash))
  - **General questions**: help-bash@gnu.org (mailto:help-bash@gnu.org) (archives (http://mail.gnu.org/pipermail/help-bash))
- Official Bash git repository:
  - **Browse**: cgit (http://git.savannah.gnu.org/cgit/bash.git)
  - **Clone**: *git:* ssh://git.sv.gnu.org/srv/git/bash.git • *ssh:* ssh://git.sv.gnu.org/srv/git/bash.git • *http:* http://git.savannah.gnu.org/r/bash.git

Recommended Shell resources

- Greg's wiki (http://mywiki.wooledge.org/) - Greg Wooledge's (aka "greycat") wiki – with **MASSIVE** information about Bash and UNIX® in general.
  - BashFAQ (http://mywiki.wooledge.org/BashFAQ) • BashGuide (http://mywiki.wooledge.org/BashGuide) • BashPitfalls (http://mywiki.wooledge.org/BashPitfalls) • BashSheet (http://mywiki.wooledge.org/BashSheet)
- Sven Mascheck's pages (http://www.in-ulm.de/~mascheck/) - A goldmine of information. A must-read.
- #ksh channel page (https://www.mirbsd.org/ksh-chan.htm) - #ksh Freenode channel page maintains a solid collection of recommended links.
- The Grymoire Unix pages (http://www.grymoire.com/Unix/) - Good scripting information, especially read the quoting (http://www.grymoire.com/Unix/Quote.html) guide.
- Heiner's "Shell Dorado" (http://www.shelldorado.com) - Tips, tricks, links - for every situation.

- The Single Unix Specification (version 4, aka POSIX-2008) (http://pubs.opengroup.org/onlinepubs/9699919799/)
- The Austin Group (http://www.opengroup.org/austin/) - List archives (http://dir.gmane.org/gmane.comp.standards.posix.austin.general), Bug tracker (http://austingroupbugs.net/main_page.php)
- comp.unix.shell FAQ (http://cfajohnson.com/shell/cus-faq.html)
- Advanced Bash-Scripting Guide (https://tldp.org/LDP/abs/html/index.html) - last update: 10 Mar 2014, but still very useful guide.

Documentation / Reference

- **Bash**: man page (http://tiswww.case.edu/php/chet/bash/bash.html) info page (http://tiswww.case.edu/php/chet/bash/bashref.html)
- **AT&T ksh**: ksh88 (http://www2.research.att.com/sw/download/man/man1/ksh88.html) ksh93 (http://www2.research.att.com/sw/download/man/man1/ksh.html)
- mksh (https://www.mirbsd.org/htman/i386/man1/mksh.htm) (pdksh successor)
- zsh (http://zsh.sourceforge.net/Doc/)
- dash (http://man7.org/linux/man-pages/man1/dash.1.html)
- Heirloom Bourne shell (http://heirloom.sourceforge.net/man/sh.1.html)
- Thompson shell (http://v6shell.org/man/osh.1.html)

Assorted interesting links

- History and development of the traditional Bourne shell family (http://www.in-ulm.de/~mascheck/bourne/) - very interesting and nice to read!
- Interview with Chet Ramey (http://www.computerworld.com.au/article/222764/-z_programming_languages_bash_bourne-again_shell)
- Interview with Steve Bourne (http://www.computerworld.com.au/article/279011/a-z_programming_languages_sh) • Stephen Bourne - BSDCan 2015 keynote (https://www.youtube.com/watch?v=2kEJoWfobpA)
- Interview with David Korn (http://news.slashdot.org/story/01/02/06/2030205/david-korn-tells-all)
- Kernighan on the Unix pipeline (computerphile video) (https://www.youtube.com/watch?v=bKzonnwoR2I)
- Linux in general, with some shell related stuff: nixCraft: Linux Tips, Hacks, Tutorials and Ideas (http://www.cyberciti.biz/)
- Linux tutorials, guides and how-tos: RoseHosting Blog (https://www.rosehosting.com/blog/), bash script for installing WordPress (https://www.rosehosting.com/blog/script-install-wordpress-on-a-debianubuntu-vps/) and some basic shell commands (https://www.rosehosting.com/blog/basic-shell-commands-after-putty-ssh-logon/)
- Bashphorism list from the Bash IRC channel on Freenode
- Some more or less funny commandline stuff
- How to Enable SSH on Ubuntu Tutorial (https://thishosting.rocks/how-to-enable-ssh-on-ubuntu/)
- How To Make an Awesome Custom Shell with ZSH (https://linuxstans.com/how-to-make-an-awesome-custom-shell-with-zsh/)

Bash Libraries (needs review)

- An oo-style bash library for bash 4 (http://sourceforge.net/projects/oobash/) - provides tools for rapid script development and huge libraries.
- General purpose shell framework for bash 4 (https://github.com/hornos/shf3) - in development.
- General purpose bash library for bash 4 (https://github.com/chilicuil/learn/blob/master/sh/lib) - active development

Contact

Visit us in `irc.freenode.net`, channel `#bash` 😃

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