BASH REFERENCE

CONTENTS

This reference card was written by Arnold Robbins. We thank Chet Ramey (**bash**'s maintainer) for his help.

DEFINITIONS

This card describes version 2.02.0 of **bash**.

Several typefaces are used to clarify the meaning:
- **Serifa Bold** is used for computer input.
- *Serifa Italic* is used to indicate user input and for syntactic placeholders, such as *variable* or *cmd*.
- Serifa Roman is used for explanatory text.

blank – separator between words. Blanks consist of one or more spaces and/or tab characters. In addition, words are terminated by any of the following characters:

; & ( ) | < > space tab newline

command – a series of *words*.

list – one or more *pipelines*. Can be separated by **;**, **&**, **&&**, || and optionally be terminated by **;**, **&**.

n – an integer.

name – a variable, alias, function or command name.

keyword – a reserved word in the **bash** language. Keywords are special only after a **;** or newline, after another keyword, and in certain other contexts.

pat – a **bash** pattern. See Patterns.

pipeline – a command or multiple commands connected by a pipe (|).

string – a collection of characters treated as a unit.

substitution – the process of replacing parts of the command line with different text, e.g., replacing a variable with its value. **bash** performs many substitutions. This card lists them in the order they are performed.

word – a generic argument; a word. Quoting may be necessary if it contains special characters.

RESTRICTED bash

If **bash** is invoked as **rbash**, or with the **–r** option, it is *restricted*. The following actions are not allowed in a restricted shell:

changing directory with **cd**
setting or unsetting **$SHELL** or **$PATH**
using path names for commands that contain **/**
using a path name that contains **/** for the **.** command
importing functions from the environment
parsing **$SHELLOPTS** at startup
redirecting output with any of **>**, **>|**, **<>**, **>&**, **&>**, or **>>**
using **exec** to run a different command
adding or deleting built-in commands with **enable**
using **command –p** to bypass a restricted **$PATH**
using **set +r** or **set +o restricted**

These restrictions are in effect *after* executing all startup files, allowing the author of the startup files full control in setting up the restricted environment. (In practice, restricted shells are not used much, as they are difficult to set up correctly.)

Error Reporting

If you find an error in this reference and are the first to report it, we will send you a free copy of any of our references. Please write, or send electronic mail to **bugs@ssc.com**.

COMMAND LINE ARGUMENTS

bash accepts the one letter options to **set**, and the additional one letter and GNU-style long options shown below.

$ bash [*options*] [*args*]

–	ends option processing
––	ends option processing
–c *cmd*	execute *cmd* (default reads command from file named in first entry of *args* and found via path search)
–D	print all double quoted strings that are preceded by a **$** to **stdout**. This implies **–n**, no commands are executed
–i	set interactive mode
–r	set restricted mode
–s	read commands from **stdin** (default)
––dump–po–strings	same as **–D**, but output in GNU **gettext** format
––dump–strings	same as **–D**
––help	display a help message and exit successfully
––login	act like a login shell
––noediting	do not use the **readline** library to read commands when interactive
––noprofile	do not read any of the initialization files. See Invocation And Startup, below
––norc	do not read **~/.bashrc** if interactive. See Invocation And Startup, below
––posix	follow the IEEE POSIX 1003.2 standard
––rcfile *file*	use *file* instead of **~/.bashrc** if interactive
––restricted	same as **–r**
––verbose	same as **set –v**
––version	print version information on **stdout** and exit successfully

INVOCATION AND STARTUP

There are five ways that **bash** runs: normal interactive, normal non-interactive, as **sh**, in POSIX mode, or invoked via **rshd**.

1. Normal interactive: Login shells run commands in **/etc/profile**. The first of **~/.bash_profile**, **~/.bash_login**, and **~/.profile** that is found is executed. This stage is skipped if **––noprofile** is used.

Upon log out, **bash** runs **~/.bash_logout** if it exists.

Interactive non-login shells execute **~/.bashrc**, if it exists. The **––rcfile** *ifile* option changes the file that is used.

2. Normal non-interactive: Non-interactive shells do variable, command, and arithmetic substitution on the *value* of **$BASH_ENV**, and if the result names an existing file, that file is executed.

INVOCATION AND STARTUP (continued)

3. Invoked as **sh**: Interactive login shells read and execute **/etc/profile** and **~/.profile** if they exist. These files are skipped if **––noprofile** is used. Interactive shells expand **$ENV** and execute that file if it exists. Non-interactive shells do not read any startup files. After the startup files are executed, **bash** enters POSIX mode.

4. POSIX mode: When started with **––posix**, interactive shells expand **$ENV** and execute the given file. No other startup files are read.

5. Invoked via **rshd**: If run from **rshd** and not invoked as **sh**, **bash** reads **~/.bashrc**. The **––norc** option skips this step, and the **––rcfile** option changes the file, but **rshd** usually does not pass these options on to the shell it invokes.

If **$SHELLOPTS** exists in the environment at startup, **bash** enables the given options.

PROMPTING

When interactive, **bash** displays the primary and secondary prompt strings, **$PS1** and **$PS2**. **bash** expands the following escape sequences in the values of these strings.

\a	an ASCII BEL character (octal 07)
\d	the date in "Weekday Month Day" format
\e	an ASCII escape character (octal 033)
\h	the hostname up to the first dot (**.**)
\H	the full hostname
\n	a newline
\r	a carriage return
\s	the name of the shell (basename of **$0**)
\t	the time in 24-hour HH:MM:SS format
\T	the time in 12-hour HH:MM:SS format
\u	the user's username
\v	the version of **bash** (e.g., 2.02)
\V	the version and patchlevel of **bash** (e.g., 2.02.0)
\w	the current working directory
\W	the basename of the current working directory
\!	the history number of this command
\#	the command number of this command
\$	a # if the effective UID is 0, otherwise a **$**
\@	the time in 12-hour am/pm format
****	a backslash
\nnn	the character corresponding to octal value *nnn*
\[	start a sequence of non-printing characters
\]	end a sequence of non-printing characters

The history number is the number of the command in the history list, which may include commands restored from the history file. The command number is the number of this command starting from the first command run by the current invocation of the shell.

The default value of **PS1** is "**\s–\v\$** ".

HISTORY SUBSTITUTION

History expansion is similar to **csh**'s. It is enabled by default in interactive shells. History expansion happens before the shell breaks the input into words, although quoting is recognized and quoted text is treated as one history "word".

History substitution is performed on history *events*, which consist of an *event designator* (which previous line to start with), a *word designator* (which word from that line to use, starting with zero), and one or more optional *modifiers* (which parts of the words to use). Colons separate the three parts, although the colon between the event designator and word designator may be omitted when the word designator begins with ^, **$**, *, **–**, or %. Each modifier is separated from the next one with a colon. The **histchars** variable specifies the start-of-history and quick substitution characters, and also the comment character that indicates that the rest of a line is a comment. The previous command is the default event if no event designator is supplied.

The event designators are:

!	start a history substitution
!*n*	command line *n*
!–*n*	current line minus *n* (*n* previous)
!!	the previous command
!*str*	most recent command line starting with *str*
!?*str*[**?**]	most recent command line containing *str*
!#	the entire command line typed so far
^*old*^*new*^	quick substitution: repeat last command changing *old* to *new*

The word designators are:

0	the zero'th word (command name)
n	word *n*
^	the first argument, i.e., word one
$	the last argument
%	the word matched by the most recent **!?***str***?** search
*x***–***y*	words *x* through *y*. **–y** is short for **0–y**
*****	words 1 through the last (like **1–$**)
*n******	words *n* through the last (like *n***–$**)
*n***–**	words *n* through the next to last

The modifiers are:

e	remove all but the suffix of a filename
g	make changes globally, use with **s** modifier, below
h	remove the last part of a filename, leaving the "head"
p	print the command but do not execute it
q	quote the generated text
r	remove the last suffix of a filename
s/*old***/***new***/**	substitute *new* for *old* in the text. Any delimiter may be used. An **&** in the replacement means the value of *old*. With empty *old*, use last *old*, or the most recent **!?***str***?** search if there was no previous *old*
t	remove all but the last part of a filename, leaving the "tail"
x	quote the generated text, but break into words at *blanks* and newline
&	repeat the last substitution

QUOTING

c	quote single character *c*
`` `...` ``	old style command substitution
"...**"**	text treated as a single argument, double quotes removed; variable, command and arithmetic substitutions performed; use \ to quote **$**, \, `, and "
$"...**"**	like "...", but locale translation done
´...**´**	text treated as a single argument, single quotes removed; text between quotes left alone, cannot include ´
$´...**´**	text treated as a single argument, **$** and single quotes removed; no substitutions performed; ANSI C and additional escape sequences processed:

\a	alert (bell)	**\v**	vertical tab
\b	backspace	*ddd*	octal value *ddd*
\f	form feed	**\x***hhh*	hex value *hhh*
\n	newline	****	backslash
\r	carriage return	**\e**	escape, not in ANSI C
\t	horizontal tab		

ALIASING

alias *name*=*value* ...

Aliases are expanded when a command is read, not when executed. Alias names can contain any non-special character, not just alphanumerics, except for **=**. Alias expansion is done on the first *word* of a command. If the last character of the replacement text is a *blank*, then the next word in the command line is checked for alias expansion. Aliases can even be used to redefine shell keywords, but not in POSIX mode.

BRACE EXPANSION

Brace expansion is similar to **csh**'s. A word must contain at least one unquoted left brace and comma to be expanded. **bash** expands the comma-separated items in order, the result is not sorted. Brace expansions may be nested. For example:

$ **mkdir /usr/{gnu,local}/{src,bin,lib}**

TILDE SUBSTITUTION

~	substitute **$HOME**
~*user*	substitute *user*'s home directory
~+	substitute **$PWD**
~–	substitute **$OLDPWD**
~*n*	substitute **${DIRSTACK[***n***]}**. A leading **+** or **–** is allowed: negative values count from the end of the stack

Tilde substitution happens after alias expansion. It is done for *words* that begin with ~ and for variable assignment.

In variable assignments, it is also done after a **:** in the value. Tilde substitution is done as part of word expansion. This means for **${***name op word***}**, *word* will be checked for tilde substitution, but only if the operation requires the value of the right-hand side.

VARIABLE SUBSTITUTION

$*name*	reference to shell variable *name*
${*name***}**	use braces to delimit shell variable *name*
${*name***–***word***}**	use variable *name* if set, else use *word*
${*name***=***word***}**	as above but also set *name* to *word*
${*name***?***word***}**	use *name* if set, otherwise print *word* and exit (interactive shells do not exit)
${*name***+***word***}**	use *word* if *name* is set, otherwise use nothing
${*name*[*n*]**}**	element *n* in array *name*
${#*name***}**	length of shell variable *name*
${#*name*[*****]**}**	number of elements in array *name*
${#*name*[**@**]**}**	number of elements in array *name*
${*name***#***pat***}**	remove shortest leading substring of *name* that matches *pat*
${*name***##***pat***}**	remove longest leading substring of *name* that matches *pat*
${*name***%***pat***}**	remove shortest trailing substring of *name* that matches *pat*
${*name***%%***pat***}**	remove longest trailing substring of *name* that matches *pat*
${*name***:***start***}**	
${*name***:***start***:***length***}**	*length* characters of *name* starting at *start* (counting from **0**); use rest of value if no *length*. Negative *start* counts from the end. If *name* is ***** or **@** or an array indexed by ***** or **@**, *start* and *length* indicate the array index and count of elements. *start* and *length* can be arithmetic expressions
${*name***/***pattern***/***string***}**	value of *name* with first match of *pattern* replaced with *string*
${*name***/***pattern***}**	value of *name* with first match of *pattern* deleted
${*name***//***pattern***/***string***}**	value of *name* with every match of *pattern* replaced with *string*
${*name***/#***pattern***/***string***}**	value of *name* with match of *pattern* replaced with *string*; match must occur at beginning
${*name***/%***pattern***/***string***}**	value of *name* with match of *pattern* replaced with *string*; match occurs at end

Note: for **–**, **=**, **?**, and **+**, using *name***:** instead of *name* tests whether *name* is set and non-NULL; using *name* tests only whether *name* is set.

For **#**, **##**, **%**, **%%**, **/**, **//**, **/#**, and **/%**, when *name* is ***** or **@** or an array indexed by ***** or **@**, the substring or substitution operation is applied to each element.

ARITHMETIC EVALUATION

Arithmetic evaluation is done with the **let** built-in command, the **((...))** command and the **$((...))** expansion for producing the result of an expression.

All arithmetic uses **long** integers. Use **typeset –i** to get integer variables. Integer constants look like [*base***#**]*n* where *base* is a decimal number between two and 64, and *n* is in that base. The digits are **0-9**, **a-z**, **A-Z**, _ and **@**. A leading **0** or **0x** denote octal or hexadecimal.

The following operators based on C, with the same precedence and associativity, are available.

+ –	unary plus and minus
! ~	logical and bitwise negation
******	exponentiation (not in C)
*** / %**	multiply, divide, modulus
+ –	addition, subtraction
<< >>	left shift, right shift
< <= > >=	comparisons
== !=	equals, not equals
&	bitwise AND
^	bitwise XOR
|	bitwise OR
&&	logical AND, short circuit
||	logical OR, short circuit
?:	in-line conditional
= += –= *= /= %= &= |= ^= <<= >>=	assignment operators

Inside **let**, **((...))**, and **$((...))**, variable names do not need a **$** to get their values.

COMMAND SUBSTITUTION

$(*command***)**	new form
`` `command` ``	old form

Run *command*, substitute the results as arguments. Trailing newlines are removed. Characters in **$IFS** separate words (see Field Splitting). The new form is preferred for simpler quoting rules.

$((*expression***))** arithmetic substitution

The *expression* is evaluated, and the result is used as an argument to the current command.

PROCESS SUBSTITUTION

cmd **<(***list1***) >(***list2***)**

Runs *list1* and *list2* asynchronously, with **stdin** and **stdout** respectively connected via pipes using fifos or files in **/dev/fd**. These file names become arguments to *cmd*, which expects to read its first argument and write its second. This only works if you have **/dev/fd** or fifos.

FIELD SPLITTING

Quoted text becomes one word. Otherwise, occurrences of any character in **$IFS** separate words. Multiple whitespace characters that are in **$IFS** do not delimit empty words, while multiple non-whitespace characters do. When **$IFS** is not the default value, sequences of leading and trailing **$IFS** whitespace characters are removed, and printable characters in **$IFS** surrounded by adjacent **$IFS** whitespace characters delimit fields. If **$IFS** is NULL, **bash** does not do field splitting.

PATTERNS

?	match single character in filename
*	match 0 or more characters in filename
[*chars*]	match any of *chars* (pair separated by a **–** matches a range)
[!*chars*]	match any except *chars*
[^*chars*]	match any except *chars*

If the **extglob** option to **shopt** is set, the following extended matching facilities may be used.

?(*pat-list*)	optionally match any of the patterns
***(*pat-list*)	match 0 or more of any of the patterns
+(*pat-list*)	match 1 or more of any of the patterns
@(*pat-list*)	match exactly 1 of any of the patterns
!(*pat-list*)	match anything but any of the patterns

pat-list is a list of one or more patterns separated by **|**.

The POSIX **[[=***c***=]]** and **[[.***c***.]]** notations for same-weight characters and collating elements are accepted. The notation **[[:***class***:]]** defines character classes:

alnum	alphanumeric	**lower**	lower-case
alpha	alphabetic	**print**	printable
blank	space or tab	**punct**	punctuation
cntrl	control	**space**	whitespace
digit	decimal	**upper**	upper-case
graph	non-spaces	**xdigit**	hexadecimal

Three **shopt** options affect pattern matching.

dotglob	include files whose names begin with **.**
nocaseglob	ignore case when matching
nullglob	remove patterns that don't match

When expanding filenames, **.** and **..** are ignored, filenames matching the patterns in **$GLOBIGNORE** are also ignored and a leading **.** must be supplied in the pattern to match filenames that begin with **.** . However, setting **GLOBIGNORE** enables the **dotglob** option. Include **.*** in **GLOBIGNORE** to get the default behavior.

VARIABLE NAMES

Variable names are made up of letters, digits and underscores. They may not start with a digit. There is no limit on the length of a variable name, and the case of letters is significant.

VARIABLE ASSIGNMENT

Assignments to integer variables undergo arithmetic evaluation. Variable assignments have one of the following forms.

name=*word*	set *name* to *word*
name[*index*]=*word*	set element *index* of array *name* to *word*
name=(*word* ...)	set indexed array *name* to *words*
name=([*num*]=*word* ...)	set given indices of array *name* to *words*

PRE-DEFINED VARIABLES

$*n*	use positional parameter *n*, *n* ≤ 9
${*n*}	use positional parameter *n*
$*	all positional parameters
$@	all positional parameters
"$*"	equivalent to **"$1 $2 ..."**
"$@"	equivalent to **"$1" "$2" ...**
$#	number of positional parameters
$–	options to shell or by **set**
$?	value returned by last command
$$	process number of current shell
$!	process number of last background cmd
$_	name of program in environment at startup. Value of last positional argument in last command. Name of changed mail file in **$MAILPATH**
$auto_resume	enables use of single-word commands to match stopped jobs for foregrounding. With a value of **exact**, the word must exactly match the command used to start the job. With a value of **substring**, the typed word can be a substring of the command, like **%?***string*
$BASH	full file name used to invoke **bash**
$BASH_ENV	in normal non-interactive shells only, value is variable, command and arithmetic substituted for path of startup file (See Invocation And Startup)
$BASH_VERSION	the version of **bash**
$BASH_VERSINFO[0]	the major version number (release)
$BASH_VERSINFO[1]	the minor version number (version)
$BASH_VERSINFO[2]	the patchlevel
$BASH_VERSINFO[3]	the build version
$BASH_VERSINFO[4]	the release status
$BASH_VERSINFO[5]	same as **$MACHTYPE**
$CDPATH	search path for **cd** command
$DIRSTACK[*]	array variable containing the **pushd** and **popd** directory stack
$ENV	in interactive POSIX mode shells, or when invoked as **sh**, value is variable, command and arithmetic substituted for path of startup file
$EUID	the effective user id (readonly)
$FCEDIT	default editor for the **fc** command (no default value)
$FIGNORE	colon-separated list of suffixes giving the set of filenames to ignore when doing filename completion using **readline**
$GLOBIGNORE	colon-separated list of patterns giving the set of filenames to ignore when doing pattern matching
$GROUPS[*]	readonly array variable with the list of groups the user belongs to
$histchars	characters that control **csh**-style history (default: **!^#**). See History Substitution

PRE-DEFINED VARIABLES (continued)

$HISTCMD	history number of the current command
$HISTCONTROL	with a value of **ignorespace**, do not enter lines that begin with spaces into the history file. With a value of **ignoredups**, do not enter a line that matches the previous line. Use **ignoreboth** to combine both options
$HISTFILE	where command history is stored
$HISTFILESIZE	maximum number of lines to keep in **$HISTFILE**
$HISTIGNORE	colon-separated list of patterns; if the current line matches any of them, the line is not entered in the history file. **&** represents the last history line. Patterns must match the whole line
$HISTSIZE	number of previous commands to keep available while **bash** is running
$HOME	home directory for **cd** command and value used for tilde expansion
$HOSTFILE	file in format of **/etc/hosts** to use for hostname completion
$HOSTNAME	name of the current host
$HOSTTYPE	string describing the current host
$IFS	field separators (**space**, **tab**, **newline**)
$IGNOREEOF	for interactive shells, the number of consecutive EOFs that must be entered before **bash** actually exits
$INPUTRC	name of **readline** startup file, overrides **~/.inputrc**
$LANG	name of current locale
$LC_ALL	current locale; overrides **$LANG** and other **$LC_** variables
$LC_COLLATE	current locale for character collation, includes sorting results of filename expansion
$LC_CTYPE	current locale for character class functions (see Patterns)
$LC_MESSAGES	current locale for translating **$"..."** strings
$LINENO	line number of line being executed in script or function
$MACHTYPE	a string in GNU *cpu-company-system* format describing the machine running **bash**
$MAIL	name of a mail file, if any
$MAILCHECK	check for mail every *n* seconds (**60** default)
$MAILPATH	filenames to check for new mail; uses **:** separator; *filename* may be followed by **?***message*; **$_** in *message* is matched mail file name. Overrides **$MAIL**
$OLDPWD	previous working directory
$OPTARG	value of last argument processed by **getopts**
$OPTERR	if set to 1, display error messages from **getopts** (default: **1**)
$OPTIND	index of last argument processed by **getopts**

PRE-DEFINED VARIABLES (continued)

$OSTYPE	string describing the operating system running **bash**
$PATH	command search path
$PIPESTATUS[*]	array variable containing exit status values from processes in the most recently executed foreground pipeline
$PPID	process id of shell's parent
$PROMPT_COMMAND	command to run before each primary prompt
$PS1	primary prompt string (**\s–\v\$**)
$PS2	secondary prompt string (**>**)
$PS3	**select** command prompt string (**#?**)
$PS4	tracing prompt string (**+**)
$PWD	current working directory
$RANDOM	set each time it's referenced, 0 – 32767
$REPLY	set by the **select** and **read** commands
$SECONDS	number of seconds since shell invocation
$SHELL	name of this shell
$SHELLOPTS	colon-separated list of the enabled shell options for **set –o**
$SHLVL	incremented by one for each sub-**bash**
$TIMEFORMAT	format string for output of **time** keyword. Special constructs introduced by **%**.

%[*p*][**l**]**R**	elapsed secs
%[*p*][**l**]**U**	user CPU secs
%[*p*][**l**]**S**	system CPU secs
%P	CPU percentage
%%	literal %

Optional *p* gives the precision, the number of digits after the decimal point; it must be between 0 and 3. Optional **l** produces a longer format, in the form *MM***m***SS*.*FF***s**

$TMOUT	number of seconds to wait during prompt before terminating
$UID	the real user id (readonly)

FUNCTIONS

Functions run in the same process as the calling script, and share the open files and current directory. They access their parameters like a script, via **$1**, **$2** and so on. **$0** does not change. **return** may be used inside a function or **.** script. Functions share traps with the parent script, except for **DEBUG**. Functions may be recursive, and may have local variables, declared using **declare**, **local**, or **typeset**. Functions may be exported into the environment with **export –f**.

INPUT/OUTPUT

Redirections are done left to right, after pipes are set up. Default file descriptors are **stdin** and **stdout**. File descriptors above 2 are marked close-on-exec.

&>*word*	send **stdout** and **stderr** to *word*
>&*word*	send **stdout** and **stderr** to *word*
[*n*]**<***file*	use *file* for input
[*n*]**>***file*	use *file* for output
[*n*]**>|***file*	like **>**, but overrides **noclobber**
[*n*]**>>***file*	like **>** but append to *file* if it exists
[*n*]**<>***file*	open *file* for read/write (default: fd0)
[*n*]**<&***m*	duplicate input file descriptor from *m*
[*n*]**>&***m*	duplicate output file descriptor from *m*
[*n*]**<&–**	close input file descriptor
[*n*]**>&–**	close output file descriptor

[*n*]**<<***word*

input comes from the shell script; treat a line with *word* as EOF on input. If any of *word* is quoted, no additional processing is done on input by the shell. Otherwise:

- do variable, command, arithmetic substitutions
- ignore escaped newlines
- use \ to quote \, **$**, `, and first character of *word*

[*n*]**<<–***word* as above, but with leading tabs ignored

Of **&>** and **>&**, the first is preferred. It is equivalent to >*word* **2>&1**.

EXECUTION ORDER

All substitutions and I/O redirections are performed before a command is actually executed.

bash maintains an internal hash table for caching external commands. Initially, this table is empty. As commands are found by searching the directories listed in **$PATH**, they are added to the hash table.

The command search order is shell functions first, built-in commands second, and external commands (first in the internal hash table, and then via **$PATH**) third.

SIGNALS AND TRAPS

Signal handling is done with the **trap** built-in command. The *word* argument describing code to execute upon receipt of the signal is scanned twice by **bash**; once when the **trap** command is executed, and again when the signal is caught. Therefore it is best to use single quotes for the **trap** command. Traps are executed in order of signal number. You cannot change the status of a signal that was ignored when the shell started up.

Traps on **DEBUG** happen after commands are executed.

Backgrounded commands (those followed by **&**) will ignore the **SIGINT** and **SIGQUIT** signals if the **monitor** option is turned off. Otherwise, they inherit the values of the parent **bash**.

ARRAYS

Arrays in **bash** have no limits on the number of elements. Array indices start at 0. Array subscripts can be arithmetic expressions. Array elements need not be contiguous. **bash** does not have associative arrays.

CONTROL COMMANDS

! *pipeline*
execute *pipeline*. If exit status was non-zero, exit zero. If exit status was zero, exit 1

case *word* **in** [[**(**]*pat1*[**|***pat2*]...**)** *list* **;;**]... **esac**
execute *list* associated with *pat* that matches *word*. Field splitting is not done for *word*. *pat* is a **bash** pattern (see Patterns). **|** is used to indicate an OR condition. Use leading **(** if **case** is inside **$( )**

for *name* [**in** *words*] **; do** *list* **; done**
sequentially assign each *word* to *name* and execute *list*. If **in** *words* is missing use the positional parameters

[**function**] *func* **( ) {** *list* **; }**
define function *func*, body is *list* (see Functions)

if *list1* **; then** *list2* [**; elif** *list3* **; then** *list4*]...[**; else** *list5*] **; fi**
if executing *list1* returns successful exit status, execute *list2* else ...

select *name* [**in** *words*] **; do** *list* **; done**
print a menu of *words*, prompt with **$PS3** and read a line from **stdin**, saving it in **$REPLY**. If the line is the number of one of the words, set *name* to it, otherwise set *name* to NULL. Execute *list*. If **in** *words* is missing use the positional parameters. **bash** automatically reprints the menu at the end of the loop

time [**–p**] *pipeline*
execute *pipeline*; print elapsed, system and user times on **stderr**.
–p print times in POSIX format
The **$TIMEFORMAT** variable controls the format of the output if **–p** is not used. **bash** uses the value **$'\nreal\t%3lR\nuser\t%3lU\nsys\t%3lS'** if there is no value for **$TIMEFORMAT**

until *list1* **; do** *list2* **; done**
like **while** but negate the termination test

while *list1* **; do** *list2* **; done**
execute *list1*. If last command in *list1* had a successful exit status, execute *list2* followed by *list1*. Repeat until last command in *list1* returns an unsuccessful exit status

((...**))**
arithmetic evaluation, like **let** "..."

[[*expression***]]**
evaluate *expression*, return successful exit status if true, unsuccessful if false (see Conditional Expressions for details)

(*list***)**
execute *list* in a sub-shell

{ *list***;}**
execute *list* in the current shell

CONDITIONAL EXPRESSIONS

Used with the **[[...]]** compound command, which does not do pattern expansion or word splitting.

string	true if *string* is not NULL
–a *file*	true if *file* exists (**–e** is preferred)
–b *file*	true if *file* is a block device
–c *file*	true if *file* is a character device
–d *file*	true if *file* is a directory
–e *file*	true if *file* exists
–f *file*	true if *file* is a regular file
–g *file*	true if *file* has setgid bit set
–G *file*	true if *file* group is effective gid
–h *file*	true if *file* is a symbolic link
–k *file*	true if *file* has sticky bit set
–L *file*	true if *file* is a symbolic link
–n *string*	true if *string* has non-zero length
–N *file*	true if *file* exists and was modified since last read
–o *option*	true if *option* is on
–O *file*	true if *file* owner is effective uid
–p *file*	true if *file* is a fifo (named pipe)
–r *file*	true if *file* is readable
–s *file*	true if *file* has non-zero size
–S *file*	true if *file* is a socket
–t *filedes*	true if *filedes* is a terminal
–u *file*	true if *file* has setuid bit set
–w *file*	true if *file* is writable
–x *file*	true if *file* is executable
–z *string*	true if *string* has zero length
file1 **–nt** *file2*	true if *file1* is newer than *file2* or *file2* does not exist
file1 **–ot** *file2*	true if *file1* is older than *file2* or *file2* does not exist
file1 **–ef** *file2*	true if *file1* and *file2* are the same file
string **==** *pattern*	true if *string* matches *pattern*
string **!=** *pattern*	true if *string* does not match *pattern*
string1 **<** *string2*	true if *string1* is before *string2*
string1 **>** *string2*	true if *string1* is after *string2*
exp1 **–eq** *exp2*	true if *exp1* equals *exp2*
exp1 **–ne** *exp2*	true if *exp1* does not equal *exp2*
exp1 **–lt** *exp2*	true if *exp1* is less than *exp2*
exp1 **–gt** *exp2*	true if *exp1* is greater than *exp2*
exp1 **–le** *exp2*	true if *exp1* is less than or equal to *exp2*
exp1 **–ge** *exp2*	true if *exp1* is greater than or equal to *exp2*
(*expression***)**	true if *expression* is true, for grouping
! *expression*	true if *expression* is false
exp1 **&&** *exp2*	true if *exp1* AND *exp2* are true
exp1 **||** *exp2*	true if *exp1* OR *exp2* is true

If *file* is **/dev/fd/***n*, then, if there is no **/dev/fd** directory, file descriptor *n* is checked. Otherwise, the real **/dev/fd/***n* file is checked. Linux, FreeBSD, BSD/OS (and maybe others) return info for the indicated file descriptor, instead of the actual **/dev/fd** device file.

Both **&&** and **||** are short circuit. Operands of comparison operators undergo arithmetic evaluation. For **==** and **!=**, quote any part of *pattern* to treat it as a string.

BUILT-IN COMMANDS

These commands are executed directly by the shell. Almost all accept **––** to mark the end of options.

. *file*
source *file*
read and execute commands from *file*. If arguments, save and restore positional params. Search **$PATH**; if nothing found, look in the current directory

: null command; returns 0 exit status

[see **test**

alias [**–p**] [*name*[**=***value*] ...]
create an alias. With no arguments, print all aliases. With *name*, print alias value for *name*
–p print **alias** before each alias

bg [*jobid*]
put *jobid* in the background

bind [**–m** *map*] [**–lpPsSvV**]
bind [**–m** *map*] [**–q** *func*] [**–r** *keyseq*] [**–u** *func*]
bind [**–m** *map*] **–f** *file*
bind [**–m** *map*] *keyseq***:***func*
display and/or modify **readline** function and key bindings. The syntax is same as for **~/.inputrc**

–f *file*	read new bindings from *file*
–l	list the names of all **readline** functions
–m *map*	use the keymap *map*
–p	list **readline** functions and bindings for re-reading
–P	list **readline** functions and bindings
–q *func*	show which keys invoke *func*
–r *keyseq*	remove bindings for *keyseq*
–s	list **readline** key sequences and macros for re-reading
–S	list **readline** key sequences and macros
–u *func*	remove key bindings for *func*
–v	list **readline** variable names and values for re-reading
–V	list **readline** variable names and values

break [*n*]
exit from enclosing **for**, **while**, **until** or **select** loop. If *n* is supplied, exit from *n*'th enclosing loop

builtin *shell-builtin* [*args* ...]
execute *shell-builtin* with given *args* and return status. Useful for the body of a shell function that redefines a built-in, e.g., **cd**

cd [**–LP**] [*dir*]
change current directory to *dir* (**$HOME** default). Do directory path search using value of **$CDPATH**

–L	use logical path for **cd ..**, **$PWD** (default)
–P	use physical path for **cd ..**, **$PWD**

If both are given, the last one on the command line wins

cd [**–LP**] **–**
change current directory to **$OLDPWD**

command [**–pvV**] *name* [*arg* ...]
without **–v** or **–V**, execute *name* with arguments *arg*

–p	use a default search path, not **$PATH**
–v	print a one word description of *name*
–V	print a verbose description of *name*

continue [*n*]
do next iteration of enclosing **for**, **while**, **until** or **select** loop. If *n* is supplied, iterate *n*'th enclosing loop

BUILT-IN COMMANDS (continued)

declare [±**afFirx**] [**–p**] [*name*[=*value*]]
typeset [±**afFirx**] [**–p**] [*name*[=*value*]]
set attributes and values of variables. Inside functions, create new copies of the variables. Using **+** instead of **–** turns attributes off. With no names or attributes, print every variable's name and attributes
–a *name* is an array
–f each *name* is a function
–F don't show function definitions (bodies)
–i *name* is an integer; arithmetic evaluation is done upon assignment
–r mark *names* **readonly**
–x mark *names* for **export**
dirs [**–clpv**] [**+***n*] [**–***n*]
display the directory stack
+*n* show *n*'th entry from left, $n \geq 0$
–*n* show *n*'th entry from right, $n \geq 0$
–c clear the directory stack
–l print a longer format listing
–p print the stack one entry per line
–v print the stack one entry per line, with index numbers
disown [**–ar**] [**–h**] [*job* ...]
with no options, remove named *jobs* from the table of active jobs
–a remove or mark (with **–h**) all jobs
–h mark each *job* to not receive a **SIGHUP** when **bash** terminates
–r use with **–h** to mark just running jobs
echo [**–eEn**] [*words*]
echo *words*; **--** is not special
–e expand \-escapes (see *echo*(1))
–E never expand \-escapes
–n don't output trailing newline
printf is more portable
enable [**–adnps**] [**–f** *file*] [*name* ...]
enable and disable shell built-ins, or load and unload new built-ins from shared library files. Disabling a built-in allows use of a disk file with the same name as a built-in
–a print all built-ins, with their status
–d delete a built-in loaded with **–f**
–f *file* load a new built-in *name* from *file*
–n disable *name*, or print disabled built-ins with no *names*
–p print enabled built-ins
–s print only POSIX special built-ins
eval [*words*]
evaluate *words* and execute result
exec [**–a** *name*] [**–cl**] [*words*]
execute *words* in place of the shell. If redirections only, change the shell's open files
–a use *name* for **argv[0]**
–c clear the environment first
–l place a **–** on **argv[0]** (like *login*(1))
If the exec fails, non-interactive shells exit, unless the **shopt** option **execfail** is set
exit [*n*]
exit with return value *n*. Use **$?** if no *n*

BUILT-IN COMMANDS (continued)

export [**–fnp**] [*name*[=*value*] ...]
with no arguments, print names and values of exported variables. Otherwise, export *names* to the environment of commands
–f *names* refer to functions
–n stop exporting each *name*
–p print **export** before each variable
fc [**–e** *editor*][**–nlr**][*first* [*last*]]
print a range of commands from *first* to *last* from last **$HISTSIZE** commands
–e run *editor* if supplied; if not, use first of **$FCEDIT**, **$EDITOR**, or **vi** on commands; execute result(s)
–l list on standard output instead of editing
–n don't print line numbers
–r reverse order of commands
fc –s [*old*=*new*] [*command*]
substitute *new* for *old* in *command* (or last command if no *command*) and execute the result
fg [*jobid*]
put *jobid* in the foreground
getopts *optstring name* [*arg* ...]
parse parameters and options (see *bash*(1))
hash [**–r**] [**–p** *file*] [*name*]
with no arguments, print the hash table contents, giving hit count and file name
–p *file* enter *file* for *name* in the hash table
–r clear the internal hash table
Assignment to **$PATH** also clears the hash table
help [*pattern*]
print help. With *pattern*, print help about all the commands that match *pattern*
history [*n*]
history –anrw [*file*]
history [**–c**]
history –p *arg* [...]
history –s *arg* [...]
with no options, print the command history. An argument of *n* prints only *n* lines. If supplied, use *file* instead of **$HISTFILE**
–a append new history lines to history file
–c clear the history list
–n read new history lines in the file into the internal history list
–p perform history substitution and print the results
–r replace internal history with contents of history file
–s place the *args* into the history list for later use
–w write the internal history to the file
jobs [**–lnprs**] [*jobid* ...]
jobs –x *command* [*args* ...]
list information about jobs
–l also list process id
–n only list stopped or exited jobs
–p only list process groups
–r only list running jobs
–s only list stopped jobs
–x replace any *jobid* in the command line with the corresponding process group ID, and execute the command

BUILT-IN COMMANDS (continued)

kill [**–***sig*] *jobid* ...
kill [**–s** *signame*] [**–n** *signum*] *jobid* ...
send **SIGTERM** or given signal to named *jobids*. Signals are names listed in **/usr/include/signal.h** with or without the prefix "SIG". Stopped jobs get a **SIGCONT** first if *sig* is either **SIGTERM** or **SIGHUP**
kill –l [*sigs* ...]
list signal names and/or numbers. If *sig* is a numerical exit status, print the signal that killed the process
let *arg* ...
evaluate each *arg* as an arithmetic expression; exit 0 if the last expression was non-zero, 1 otherwise (see Arithmetic Evaluation)
local [*name*[=*value*] ...]
create variables with the given values local to a function. With no operands, print a list of local variables. Must be used inside a function
logout
exit a login shell
popd [**–n**] [**+***n*] [**–***n*]
remove entries from the directory stack. With no arguments, remove the top entry and **cd** there
+*n* remove *n*'th entry from left, $n \geq 0$
–*n* remove *n*'th entry from right, $n \geq 0$
–n don't change directory
printf *format* [*arg* ...]
print output like ANSI C **printf**, with extensions
%b expand escape sequences in strings
%q print quoted string that can be re-read
Format conversions are reused as needed
pushd [**–n**] [*dir*]
pushd [**–n**] [**+***n*] [**–***n*]
add an entry to the directory stack. With no arguments, exchange the top two entries
+*n* rotate the stack so that the *n*'th entry from left is at the top, $n \geq 0$
–*n* rotate the stack so that the *n*'th entry from right is at the top, $n \geq 0$
–n don't change directory
dir push *dir* on the stack and **cd** there
pwd [**–LP**]
print working directory name
–L print logical path (default)
–P print physical path
If both are given, the last one on the command line wins
read [**–a** *name*] [**–er**] [**–p** *prompt*] [*names* ...]
read **stdin** and assign to *names*. **$IFS** splits input. **$REPLY** is set if no *name* given. Exit 0 unless end-of-file encountered
–a read words into indexed array *name*
–e use **readline** if reading from a terminal
–p print *prompt* if reading from a terminal before reading
–r \ at end of line does not do line continuation

BUILT-IN COMMANDS (continued)

readonly [**–afp**] [*name*=*value* ...]
mark *names* read-only; print list if no *names*
–a each *name* must be an array
–f each *name* must be a function
–p print **readonly** before each variable
return [*n*]
exit function or **.** script with return value *n*. With no *n*, return status of last command. If not in function or **.** script, print an error message
set [**–***options*] [**–o** *option*] [*words*]
set flags and options (see Options To **set**). *words* set positional parameters
set [**+***options*] [**+o** *option*] [*words*]
unset flags and options
shift [*n*]
rename positional parameters; $n+1 =$1 ...
n defaults to 1
shopt [**–opqsu**] [*option* ...]
print or change values of shell options. With no arguments, print shell option information
–o only change **set –o** options
–p print settings for re-reading
–q quiet mode; exit status indicates option status
–s set (enable) given option; with no options, print those that are set
–u unset (disable) given option; with no options, print those that are unset
(See Options To **shopt**)
suspend [**–f**]
suspend the shell until **SIGCONT** is received
–f force suspension, even for login shell
test
evaluate conditional expressions (see Options To **test** and Conditional Expressions)
times
print accumulated process times
trap [**–lp**] [*word*] [*sigs*]
execute *word* if signal in *sigs* received. *sigs* are numbers or signal names with or without "SIG". With no *word* or *sigs*, print traps. With no *word*, reset *sigs* to entry defaults. If *word* is "–", reset *sigs* to entry defaults. If *word* is the null string, ignore *sigs*. If *sigs* is **0** or **EXIT**, execute *word* on exit from shell. If *sigs* is **DEBUG**, run *word* after every command.
–l print a list of signal names and numbers
–p print traps with quoting
type [**–apt**] *name* ...
describe how the shell interprets *name*
–a print all possible interpretations of *name*
–p print the name of the file to execute if *name* is an external program
–t print a keyword describing *name*

BUILT-IN COMMANDS (continued)

ulimit [*type*] [*options*] [*limit*]
set or print per-process limits
type (default is both):
–H hard limit
–S soft limit
options:
–a all (display only)
–c core file size
–d "k" of data segment
–f maximum file size
–m "k" of physical memory
–n maximum file descriptor + 1
–p size of pipe buffers
–s "k" of stack segment
–t cpu seconds
–u max processes for one user
–v "k" of virtual memory
–f is assumed if no options are given. The size for **–p** is in 512-byte blocks; the others are in sizes of 1024 bytes

umask [**–pS**] [*mask*]
set file creation permissions mask to complement of *mask* if octal, or symbolic value as in **chmod**. With no arguments, print current mask. An octal mask is permissions to remove, a symbolic mask is permissions to keep
–p print output for re-reading
–S print current mask in symbolic form

unalias [**–a**] [*names*]
remove aliases *names*
–a remove all aliases

unset [**–fv**] [*names*]
unset variables *names* (same as **–v**)
–f unset functions *names*
–v unset variables *names*
Unsetting **LINENO**, **MAILCHECK**, **OPTARG**, **OPTIND**, **RANDOM**, **SECONDS**, **TMOUT** and **_** removes their special meaning, even if used afterwards

wait [*jobid* ...]
wait for job *jobid*; if no *job*, wait for all children

OPTIONS TO test

The **test** command, and its synonym **[...]**, are built-in to **bash**. The command accepts all of the options listed in the Conditional Expressions section. However, since it is a command, options and arguments must be quoted to get proper behavior, and normal pattern expansion and field splitting are done. Parentheses used for grouping must be quoted. Arithmetic expansion is not done for numeric operators, and pattern matching is not done for **==** and **!=**. **test** complies with POSIX.

The **–a** and **–o** options have the following meanings, instead of the ones listed in Conditional Expressions:

–a logical AND
–o logical OR

OPTIONS TO set

The **set** command is complicated. Here is a summary. Use **+** instead of **–** to turn options off. With no arguments, **set** prints the names and values of all variables.

set [±**abBCefhHkmnpPtuvx**] [±**o** *option* ...] [*arg* ...]

–a automatically export variables upon assignment
–b print job completion messages immediately, don't wait for next prompt
–B enable brace expansion (default)
–C force **>|** to overwrite for existing files
–e exit upon non-zero exit from a command
–f disable pattern expansion
–h save command locations in the internal hash table (default)
–H enable **!**-style history (default)
–k place all variable assignments in the environment (obsolete)
–m run background jobs in their own process group, print a message when they exit; set automatically for interactive shells on job control systems
–n read commands without executing them (ignored if interactive)
–o set options; with no arguments, print current settings
  allexport same as **–a**
  braceexpand same as **–B**
  emacs use an *emacs*-style line editor (default)
  errexit same as **–e**
  hashall same as **–h**
  histexpand same as **–H**
  history enable history
  ignoreeof like **IGNOREEOF=10**
  keyword same as **–k**
  monitor same as **–m**
  noclobber same as **–C**
  noexec same as **–n**
  noglob same as **–f**
  notify same as **–b**
  nounset same as **–u**
  onecmd same as **–t**
  physical same as **–P**
  posix obey the POSIX 1003.2 standard
  privileged same as **–p**
  verbose same as **–v**
  vi use a *vi*-style line editor
  xtrace same as **–x**
–p don't read **$ENV**, do not take shell functions from environment, and ignore options in **$SHELLOPTS** environment variable
–P follow the physical directory structure for commands that change the directory
–t read and execute one command, then exit
–u make it an error to substitute an unset variable
–v print input lines as they're read

OPTIONS TO set (continued)

–x print commands as they're executed, preceded by expanded value of **$PS4**. Output is quoted for later reuse
– turn off **–v**, **–x**, stop looking for flags; any remaining args set the positional parameters
–– do not change flags; set positional parameters from argument list; with no args, unset the positional parameters

OPTIONS TO shopt

The **shopt** command sets or unsets a number of options that affect how **bash** behaves. This section describes each option's effect when enabled. Unless noted, they are all disabled by default.

cdable_vars
treat an argument to **cd** that is not a directory as a variable whose value is the directory name

cdspell
attempt to correct minor spelling errors in arguments to **cd**. Errors tried are transposed characters, a missing character or an extra character. Only obeyed in interactive shells

checkhash
check that a command in the hash table still exists before trying to execute it. If it doesn't, search **$PATH**

checkwinsize
check the window size after each command and update **$LINES** and **$COLUMNS**

cmdhist
attempt to save all lines of a multi-line command in the history file as one line, for easy re-editing

dotglob
include files whose names begin with **.** in path expansions

execfail
keep non-interactive shells from exiting when **exec** fails

expand_aliases
expand aliases as described in Aliases. Enabled automatically in interactive shells

extglob
enable the extended pattern matching facilities (see Patterns)

histappend
append the current history to **$HISTFILE** upon exit, instead of overwriting it

histreedit
if using **readline** and a history substitution fails, the user can re-edit the line

histverify
if using **readline**, load the results of history substitution into **readline** for further editing

hostcomplete
if using **readline**, attempt host completion on word containing **@**

huponexit
send **SIGHUP** to all jobs when **bash** exits

interactive_comments
in interactive shells, a word starting with # starts a comment. Enabled by default

OPTIONS TO shopt (continued)

lithist
if **cmdhist** is also enabled, save multi-line commands with newlines, not semi-colons

mailwarn
print a warning message if a file being checked for mail was accessed since the last time it was checked

nocaseglob
do a case-insensitive match when expanding pathnames

nullglob
remove patterns that don't match any file, instead of leaving them unchanged in the command line

promptvars
do parameter expansion on the prompt variables before printing them. Enabled by default

shift_verbose
print an error message when the shift count is greater than the number of positional parameters

sourcepath
use **$PATH** to find shell files given to the **.** and **source** commands. Enabled by default

SPECIAL CHARACTERS

#	start of comment; terminated by newline
|	(pipe) connects two commands
;	command separator
&	run process in background; default **stdin** from **/dev/null** if no job control
&&	only run following command if previous command completed successfully
||	only run following command if previous command failed
'	enclose string to be taken literally
"	enclose string to have variable, command and arithmetic substitution only
$( )	in-line command substitution (new style)
`	in-line command substitution (old style)
((...))	arithmetic evaluation, like **let "..."**
$((...))	in-line arithmetic evaluation
****	treat following character literally
\ newline	line continuation

JOB IDS AND JOB CONTROL

Jobs can be represented as follows:

jobid the job identifier for a job, where:
  %% current job
  %+ current job
  %– previous job
  %?*str* job uniquely identified by *str*
  %*n* job number *n*
  %*pref* job whose command line begins with *pref*

Usually, a process ID may be used instead of a *jobid*. Commands that take a *jobid* use the current job if no *jobid* is supplied.

Traps on **SIGCHLD** execute whenever a job completes.

The commands **fg** and **bg** are only available on systems that support job control. This includes Linux, BSD systems, System V Release 4, and most UNIX systems.

READLINE

The **readline** library implements command line editing. By default, it provides an *emacs* editing interface, although a *vi* interface is available. **readline** is initialized either from the file named by **$INPUTRC** (if set), or from **~/.inputrc**. In that file, you can use conditionals, define key bindings for macros and functions, and set variables.

From the **bash** level, the **bind** command allows you to add, remove and change macro and key bindings. There are five input mode map names that control the action taken for each input character. The map names are **emacs**, **emacs-standard**, **emacs-meta**, **emacs-ctlx**, **vi**, **vi-command**, and **vi-insert**. **emacs** is the same as **emacs-standard**, and **vi** is the same as **vi-command**.

You choose which editor you prefer with **set –o emacs** or **set –o vi** in your **~/.bashrc** file, or at runtime.

readline understands the character names *DEL*, *ESC*, *LFD*, *NEWLINE*, *RET*, *RETURN*, *RUBOUT*, *SPACE*, *SPC* and *TAB*.

READLINE DIRECTIVES

Directives in the **.inputrc** file provide conditional and include facilities similar to the C preprocessor.

$include
include a file, e.g., a system-wide **/etc/inputrc** file

$if
start a conditional, for terminal or application specific settings. You can test the following:

application=	test the application, e.g. **bash** or **gdb**
mode=	test the editing mode, *emacs* or *vi*
term=	test the terminal type

The use of **application=** is optional; e.g., **$if Bash**

$else
start the "else" part of a conditional

$endif
finish a conditional

READLINE KEY BINDINGS

Keys bound to a macro place the macro text into the input; keys bound to a function run the function.

You can use these escape sequences in bindings:

\a	alert (bell)	**\r**	carriage return
\b	backspace	**\t**	horizontal tab (TAB)
\C–	control prefix	**\v**	vertical tab
\d	delete (DEL)	****	backslash
\e	escape (ESC)	**\"**	literal **"**
\f	form feed	**\´**	literal ´
\M–	meta prefix	*\ddd*	octal value *ddd*
\n	newline	**\x***hhh*	hex value *hhh*

Macros and function bindings look like:

macro:	*key-seq*:"*text*"
function:	*key-seq*:*function-name*

Macros have quoted text on the right of the colon; functions have function names. A *key-seq* is either a single character or character name (such as **Control–o**), or a quoted string of characters (single or double quotes).

READLINE VARIABLES

Variables control different aspects of **readline**'s behavior. You set a variable with

set *variable value*

Unless otherwise noted, *value* should be either **On** or **Off**. The descriptions below describe the effect when the variable is **On**. Default values are shown in parentheses.

bell-style (audible)
defines how **readline** should ring the bell:

audible	ring the bell
none	never ring the bell
visible	flash the screen

comment-begin (#)
insert this string for **readline-insert-comment**, (bound to **M-#** in *emacs* mode and to **#** in *vi* mode)

completion-ignore-case (Off)
ignore case when doing completions

completion-query-items (100)
if the number of completion items is less than this value, place them in the command line. Otherwise, ask the user if they should be shown

convert-meta (On)
treat characters with the eighth bit set as the meta version of the equivalent seven bit character

disable-completion (Off)
do not do completion

editing-mode (emacs)
set the initial editing mode. Possible values are **emacs** or **vi**

enable-keypad (Off)
attempt to enable the application keypad. This may be needed to make the arrow keys work

expand-tilde (Off)
attempt tilde expansion as part of word completion

input-meta (Off)

meta-flag (Off)
enable eight bit input. The two variable names are synonyms

keymap (emacs)
set the current keymap. See Readline for a list of allowed values. The **editing-mode** variable also affects the keymap

mark-directories (On)
append a **/** to completed directory names

mark-modified-lines (Off)
place a ***** at the front of modified history lines

output-meta (Off)
print characters with the eighth bit set directly, not as **M-***x*

print-completions-horizontally (Off)
display completions horizontally, with the matches sorted alphabetically, instead of vertically down the screen

show-all-if-ambiguous (Off)
immediately list words with multiple possible completions, instead of ringing the bell

visible-stats (Off)
when listing possible completions, append a character that denotes the file's type

More information about **readline** can be found on-line at **http://www.ssc.com/ssc/bash**.