

# Bourne Shell Quick Reference Card

## I. Introduction to Shell Scripts

- A. The shell is the program that you run when you log in
- B. It is a command interpreter
- C. There are three standard shells - C, Korn and Bourne
- D. Shell prompts users, accepts command, parses, then interprets command
- E. Most common form of input is command line input  
cat file1 file2 file3
- F. Most commands are of the format  
command [- option list] [argument list]
- G. Redirection and such
  1. < redirect input from standard input
  2. > redirect output from standard output
  3. >> redirect output and append
  4. | "pipes" output from one command to another  
ls -l | more
  5. tee "pipes" output to file and standard out  
ls -l | tee rpt2 | more
- H. Entering commands
  1. Multiple commands can be entered on the same line if separated by ;
  2. Command can span multiple lines if \R is typed at the end of each line except the last (R stands for carriage return, i.e. ENTER). This is escape sequence.
- I. Wild card characters can be used to specify file names in commands
  1. \* 0 or more characters
  2. ? one character of any kind
  3. [, , ] list of characters to match single character
  - J. Simplest scripts combine commands on single line like  
ls -l | tee rpt2 | more
- K. Slightly more complex script will combine commands in a file
  1. Use any text editor to create file, say my\_sc
  2. Type commands into file, one per line (unless you use ; to separate)
  3. Save file
  4. Make file readable and executable (more later on this)  
chmod a+rx my\_sc
  5. run script by entering path to file  
./my\_sc  
We will make this a little easier later
- L. See examples 1 and 2

## II. Variables

- A. The statment name=value creates and assigns value to variable  
SUM=12
- B. Traditional to use all upper case characters for names
- C. Access content of variable by preceding name with \$  
echo \$SUM
- D. Arguments go from right to left
- E. Results of commands can be assigned to variables  
SYS=`hostname`
- F. Strings are anything delimited by ""
- G. Variables used in strings are evaluated
- H. See example 3
- I. System/standard variables
1. Command line arguments  
Accessed by \$1 through \$9 for the first 9 command line arguments. Can access more by using the shift command. This makes \$1 .. \$9 reference command line arguments 2-10. It can be repeated to access a long list of arguments.
2. \$# number of arguments passed on the command line
3. \$- Options currently in effect (supplied to sh or to set
4. \$\* all the command line arguments as one long double quoted string
5. @\$ all the command line arguments as a series of double quoted strings
6. \$? exit status of previous command
7. \$\$ PID of this shell's process
8. \$! PID of most recently started background job
9. \$0 First word, that is, name of command/script

## III. Conditional Variable Substitution

- A. \${var:-string} Use var if set, otherwise use string
- B. \${var:=string} Use var if set, otherwise use string and assign string to var
- C. \${var:?string} Use var if set, otherwise print string and exit
- D. \${var:+string} Use string if var if set, otherwise use nothing

## IV. Conditional

- A. The condition part can be expressed two ways. Either as  
test condition  
or  
[ condition ]  
where the spaces are significant.
- B. There are several conditions that can be tested for
  1. -s file file greater than 0 length
  2. -r file file is readable

3. -w file file is writable
4. -x file file is executable
5. -f file file exists and is a regular file
6. -d file file is a directory
7. -c file file is a character special file
8. -b file file is a block special file
9. -p file file is a named pipe
10. -u file file has SUID set
11. -g file file has SGID set
12. -k file file has sticky bit set
13. -z string length of string is 0
14. -n string length of string is greater than 0
15. string1 = string2 string1 is equal to string2
16. string1 != string2 string1 is different from string2
17. string string is not null
18. int1 -eq int2 integer1 equals integer2
19. int1 -ne int2 integer1 does not equal integer2
20. int1 -gt int2 integer1 greater than integer2
21. int1 -ge int2 integer1 greater than or equal to integer2
22. int1 -lt int2 integer1 less than integer2
23. int1 -le int2 integer1 less than or equal to integer2
24. ! condition negates (inverts) condition
25. cond1 -a cond2 true if condition1 and condition2 are both true
26. cond1 -o cond2 true if either condition1 or condition2 are true
27. \( \) used to group complex conditions

## V. Flow Control

- A. The if statement  
if condition  
then  
commands  
else  
commands  
fi
- B. Both the while and until type of loop structures are supported  
while condition  
do  
commands  
done  
  
until condition  
do  
commands  
done

- C. The case statement is also supported

```
case string in
pattern1)
commands
;;
```

```
pattern2)
commands
;;
```

```
esac
```

The pattern can either be an integer or a single quoted string

The \* is used as a catch-all default pattern

- D. The for command
- ```
for var [in list]
do
commands
done
```

where either a list (group of double quoted strings) is specified, or @\$ is used

## VI. Other Commands

- A. Output
1. Use the `echo` command to display data
  2. `echo "This is some data"` will output the string
  3. `echo "This is data for the file = $FILE"` will output the string and expand the variable first. The output from an `echo` command is automatically terminated with a newline.
- B. Input
1. The `read` command reads a line from standard input
  2. Input is parsed by whitespace, and assigned to each respective variable passed to the `read` command
  3. If more input is present than variables, the last variable gets the remainder
  4. If for instance the command was `read a b c` and you typed "Do you Grok it" in response, the variables would contain `$a="Do"`, `$b="you"` `$c="Grok it"`
- C. Set the value of variables \$1 thru \$n
1. If you do `set `command``, then the results for the command will be assigned to each of the variables \$1, \$2, etc. parsed by whitespace
- D. Evaluating expressions
1. The `expr` command is used to evaluate expressions

2. Useful for integer arithmetic in shell scripts `i=`expr $i +1``
- E. Executing arguments as shell commands
1. The `eval` command executes its arguments as a shell command

## VII. Shell functions

- A. General format is
- B. `function_name ()`
- C. {
- D. `commands`
- E. }

## VIII. Miscellaneous

- A. \n at end of line continues on to next line
- B. Metacharacters
1. \* any number of characters
  2. ? any one character
  3. [.] list of alternate characters for one character position
- C. Substitution
1. `delimit with ``` (back quote marks, generally top left corner of keyboard)
  2. executes what is in `` and substitutes result in string
- D. Escapes
1. \ single character
  2. ' groups of characters
  3. " groups of characters, but some special characters processed (\$\)
- E. Shell options
1. Restricted shell `sh -r`
    - a. can't cd, modify PATH, specify full path names or redirect output
    - b. should not allow write permissions to directory
  2. Changing shell options
    - a. Use set option `+/ -` to turn option on/off
    - b. e interactive shell
    - c. f filename substitution
    - d. n run, no execution of commands
    - e. u unset variables as errors during substitution
    - f. x prints commands and arguments during execution

## Examples

### Single Line Script

```
#!/bin/sh
# Script lists all files in current
directory in decending order by size
```

```
ls -l | sort -r -n +4 -5
```

### Multiline Script

```
#!/usr/bin/ksh
# Lists 10 largest files in current
directory by size
```

```
ls -l > /tmp/f1
sort -r -n +4 -5 /tmp/f1 > /tmp/f2
rm /tmp/f1
head /tmp/f2 > /tmp/f3
rm /tmp/f2
more /tmp/f3
rm /tmp/f3
```

```
#!/usr/bin/ksh
# Uses variables to store data from
commands
```

```
SYS=`hostname`
ME=`whoami`
W="on the system"
echo "I am $ME $W $SYS"
```

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