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Bourne Shell Reference

Bourne Shell Reference found at Br. David Carlson, O.S.B. pages, cis.stvincent.edu/carlsond/cs330/unix/bshellref - Converted to txt2tags format by xiando

This file contains short tables of commonly used items in this shell. In most cases the information applies to both the Bourne shell (sh) and the newer bash shell.

1. Tests

Tests (for ifs and loops) are done with `[ ]` or with the `test` command.

1.1. Checking files

`-r` file   Check if file is readable.

`-w` file   Check if file is writable.

`-x` file   Check if we have execute access to file.

`-f` file   Check if file is an ordinary file (as opposed to a directory, a device special file, etc.)

`-s` file   Check if file has size greater than 0.

`-d` file   Check if file is a directory.

`-e` file   Check if file exists. Is true even if file is a directory.

Example:

```
if [ -s file ]
```

```
then
   such and such
fi
```

1.2. Checking strings

s1 = s2 Check if s1 equals s2. s1 != s2 Check if s1 is not equal to s2. -z s1 Check if s1 has size 0. -n s1 Check if s2 has nonzero size. s1 Check if s1 is not the empty string.

Example:

```
if [ $myvar = "hello" ]
then
   echo "We have a match"
fi
```

1.3. Checking numbers

Note that a shell variable could contain a string that represents a number. If you want to check the numerical value use one of the following:

```
n1 -eq n2     Check to see if n1 equals n2.
n1 -ne n2     Check to see if n1 is not equal to n2.
n1 -lt n2     Check to see if n1 < n2.
n1 -le n2     Check to see if n1 <= n2.
n1 -gt n2     Check to see if n1 > n2.
n1 -ge n2     Check to see if n1 >= n2.
```

Example:

```
if [ $# -gt 1 ]
then
   echo "ERROR: should have 0 or 1 command-line parameters"
fi
```

1.4. Boolean operators

```
!     not
-a    and
-o    or
```

Example:

```
if [ $num -lt 10 -o $num -gt 100 ]
then
   echo "Number $num is out of range"
elif [ ! -w $filename ]
then
   echo "Cannot write to $filename"
fi
```

Note that ifs can be nested. For example:

```
if [ $myvar = "y" ]
then
   echo "Enter count of number of items"
   read num
   if [ $num -le 0 ]
   then
      echo "Invalid count of $num was given"
   else
      ... do whatever ...
   fi
fi
```

The above example also illustrates the use of read to read a string from the keyboard and place it into a shell variable. Also note that most UNIX commands return a true (nonzero) or false (0) in the shell variable status to indicate whether they succeeded or not. This return value can be checked. At the command line echo $status. In a shell script use something like this:

```
if grep -q shell bshellref
then
   echo "true"
else
   echo "false"
fi
```

Note that -q is the quiet version of grep. It just checks whether it is true that the string shell occurs in the file bshellref. It does not print the matching lines like grep would otherwise do.

2. I/O Redirection

```
pgm > file      Output of pgm is redirected to file.
pgm < file      Program pgm reads its input from file.
pgm >> file     Output of pgm is appended to file.
pgm1 | pgm2     Output of pgm1 is piped into pgm2 as the input to pgm2.
n > file        Output from stream with descriptor n redirected to file.
n >> file       Output from stream with descriptor n appended to file.
n >& m          Merge output from stream n with stream m.
n <& m          Merge input from stream n with stream m.
<< tag          Standard input comes from here through next tag at start of line.
```

Note that file descriptor 0 is normally standard input, 1 is standard output, and 2 is standard error output.

3. Shell Built-in Variables

```
$0              Name of this shell script itself.
$1              Value of first command line parameter (similarly $2, $3, etc)
$#              In a shell script, the number of command line parameters.
$*              All of the command line parameters.
$-              Options given to the shell.
$?              Return the exit status of the last command.
$$              Process id of script (really id of the shell running the script)
```

4. Pattern Matching

```
*              Matches 0 or more characters.
?              Matches 1 character.
[AaBbCc]       Example: matches any 1 char from the list.
[^RGB]         Example: matches any 1 char not in the list.
[a-g]          Example: matches any 1 char from this range.
```

5. Quoting

```
\c             Take character c literally.
`cmd`          Run cmd and replace it in the line of code with its output.
"whatever"     Take whatever literally, after first interpreting $, `...`, \
'whatever'     Take whatever absolutely literally.

Example:
   match=`ls *.bak`         #Puts names of .bak files into shell variable match.
   echo \*                  #Echos * to screen, not all filename as in:  echo *
   echo '$1$2hello'         #Writes literally $1$2hello on screen.
   echo "$1$2hello"         #Writes value of parameters 1 and 2 and string hello.
```

6. Grouping

Parentheses may be used for grouping, but must be preceded by backslashes since parentheses normally have a different meaning to the shell (namely to run a command or commands in a subshell). For example, you might use:

```
if test \( -r $file1 -a -r $file2 \) -o \( -r $1 -a -r $2 \)
then
   do whatever
fi
```

7. Case statement

Here is an example that looks for a match with one of the characters a, b, c. If $1 fails to match these, it always matches the * case. A case statement can also use more advanced pattern matching.

```
case "$1" in
   a) cmd1 ;;
   b) cmd2 ;;
   c) cmd3 ;;
   *) cmd4 ;;
esac
```

8. Shell Arithmetic

In the original Bourne shell arithmetic is done using the expr command as in: result=`expr $1 + 2` result2=`expr $2 + $1 / 2` result=`expr $2 \* 5` (note the \ on the * symbol)

With bash, an expression is normally enclosed using [ ] and can use the following operators, in order of precedence: * / % (times, divide, remainder)

1. - (add, subtract) < > <= >= (the obvious comparison operators) == != (equal to, not equal to) &&
   (logical and)

 (logical or)

= (assignment) Arithmetic is done using long integers.

```
Example:
   result=$[$1 + 3]
```

In this example we take the value of the first parameter, add 3, and place the sum into result.

9. Order of Interpretation

The bash shell carries out its various types of interpretation for each line in the following order:

```
brace expansion          (see a reference book)
~ expansion              (for login ids)
parameters               (such as $1)
variables                (such as $var)
command substitution     (Example:  match=`grep DNS *` )
arithmetic               (from left to right)
word splitting
pathname expansion       (using *, ?, and [abc] )
```

10. Other Shell Features

```
$var            Value of shell variable var.
${var}abc       Example: value of shell variable var with string abc appended.
#               At start of line, indicates a comment.
var=value       Assign the string value to shell variable var.
cmd1 && cmd2    Run cmd1, then if cmd1 successful run cmd2, otherwise skip.
cmd1 || cmd2    Run cmd1, then if cmd1 not successful run cmd2, otherwise skip.
cmd1; cmd2      Do cmd1 and then cmd2.
cmd1 & cmd2     Do cmd1, start cmd2 without waiting for cmd1 to finish.
(cmds)          Run cmds (commands) in a subshell.
```

See a good reference book for information on traps, signals, exporting of variables, functions, eval, source, etc.

- http://cis.stvincent.edu/carlsond/cs330/unix/bshellref

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