

## Bourne again shell programming

- Learning the bash shell, by Cameron Newham & Bill Rosenblatt, Published by O'Reilly, ISBN 1-56592-347-2
- bourne shell provides us with a number of flow control constructs
  - if, elif, else, fi
  - while
  - for, do, done
  - case
    - C switch
  - select
    - menu selection
- select is not standard bourne shell so beware of using it

## if elif else fi

- simplest type of flow control and has syntax:

```
if condition ; then
    statements
elif condition ; then
    statements
else
    statements
fi
```

- the *condition* is really a list of statements which returns an exit status
- in GNU/Linux an exit status of zero indicates no error
  - if checks the status of the last statement

## if then else fi example

- guideline: *try and write your if statements to conform to the following style:*

```
if command ran successfully ; then
    normal processing
else
    error processing
fi
```

- for example

```
#!/bin/sh

HOST=mcgreg.comp.glam.ac.uk

if ping -c 1 $HOST >& /dev/null ; then
    echo "$HOST is alive and kicking"
else
    echo "$HOST is probably unwell"
fi
```

## Explanation of the script

- note that the `>& /dev/null` sends all output
  - both stderr and stdout to a pseudo device null
  - null reads any amount of input and throws it away (swallows it)
- the `#!/bin/sh` informs GNU/Linux to run your script with `/bin/sh`
- `ping -c 1 mcgreg.comp.glam.ac.uk` sends a single packet to `mcgreg.comp.glam.ac.uk` and waits for a reply

## Expressions

- multiple statements can be combined via `&&` and `||`
  - common use:

```
if statement1 && statement2 ; then
  echo "both statement1 and \
      statement2 executed correctly"
fi
```

```
if statement1 || statement2 ; then
  echo "either statement1 ran and \
      statement2 was never executed or \
      statement1 failed and statement2 \
      executed correctly"
fi
```

## Expressions

- a common use of the previous or `||` condition is to write the following code:

```
function die () {
  echo "die: because $1 failed"
  exit 1
}

if statement1 || die "statement1" ; then
  echo "everything is ok"
fi
```

- and make `die` a function which never returns and terminates the script

## Condition tests

- the `test` ability in an expression is quite powerful
- `test` can either be invoked as

```
if test -x /usr/bin/gcc ; then
  echo gcc exists on this system
fi
```

- or via:

```
if [ -x /usr/bin/gcc ] ; then
  echo gcc exists on this system
fi
```

- they are identical, people tend to prefer the later as it looks more like an expression

## More condition tests

- for a definitive list of condition tests
  - type `man test` when logged into GNU/Linux

- 

test synopsis	
operator	true if ..
<code>str1 = str2</code>	str1 matches str2
<code>str1 != str2</code>	str1 does not match str2
<code>str1 &lt; str2</code>	str1 is less than str2
<code>str1 &gt; str2</code>	str1 is greater than str2
<code>-n str1</code>	str1 is not null
<code>-z str1</code>	str1 is null (length 0)
<code>-f str1</code>	file str1 exists
<code>-x str1</code>	file str1 exists and is executable
<code>str1 -ot str2</code>	file str1 is older than file str2
<code>str1 -nt str1</code>	file str1 is newer than file str2
<code>-d str1</code>	a directory called str1 exists

## while

- has the syntax:

```
while condition ; do
  statements
done
```

- we might write a simple administration script as:

```
while !ping -c 1 mcgreg.comp.glam.ac.uk ; do
  echo "hmm mcgreg is not responding"
  sleep 30 # wait for 30 seconds
done
echo "mcgreg is alive and well"
```

## Comment character

- note the comment character is #
  - everything to the right of the comment character is ignored

## Autoftp

- we will build up a simple application using bash and expect called autoftp
  - autoftp [-p] [-v] *autoftprc*
    - -p probes the ftp sites and checks urls in *autoftprc* are valid
    - -v makes autoftp issue verbose trace logs
    - *autoftprc* file is plain text ftp urls
- autoftp will automatically download a list of files from a list of ftp urls held inside *autoftprc*

## Typical autoftprc file

- might contain:

```
# GNU Troff
j228-gm.comp.glam.ac.uk/pub/groff/groff.tar.gz # this is
j228-gm.comp.glam.ac.uk/pub/groff/README # another
```

## Tutorial Exercise

- write a shell script program to emit a simple message onto the screen:

```
#!/bin/sh
cat << EOF
This is my simple message which will
be echoed to the screen
EOF
```

- hint read through the notes titled: [Setting the scene](#) (1.html)

## Tutorial Exercise

- write a small shell script to test whether a user has used OpenOffice
  - you can tell whether a user has invoked StarOffice as there will be a directory `OpenOffice.org1.1` in their home directory (`$HOME`)

## Laboratory Exercise

- suppose your shell script is run every time a user logs into GNU/Linux
  - extend your program so that it issues the following friendly user message if the user has *never* used OpenOffice

```
You might be interested in OpenOffice which is
a Microsoft WORD compatible.
```

## Laboratory

- using xemacs or an editor you are familiar with, create a file called `autoftprc` and type our example `autoftprc` contents
- now create another file called, `autoftp.sh`. Type in the following

```
#!/bin/sh
cut -d '#' -f1 $1
```

- make it executable and then type: `./autoftp.sh autoftprc`
  - write down the output, what has your program done?
  - what is `$1` ?
  - hint try executing your program using debugging:
  - `sh -x autoftp.sh autoftprc`

## Extending autoftp.sh

- now modify your program to look like this:

```
#!/bin/sh
TMP=/tmp/auto.$$
cut -d '#' -f1 $1 > $TMP
n=`wc -l $TMP | cut -b 0-7`
i=1
while [ $i -le $n ]
do
  line=`head -$i $TMP | tail -1`
  if [ "$line" != "" ]
  then
    SITE=`echo $line | cut -d '/' -f 1`
    FILE=`echo $line | cut -d '/' -f 2-`
    echo "site is" $SITE "file is" $FILE
  fi
  i=`expr $i + 1`
done
/bin/rm -f $TMP
```

## Extending autoftp.sh

- run it using: `./autoftp.sh autoftprc`
  - it should produce the following output

```
site is floppsie.. file is pub/groff/groff.tar.gz
site is floppsie.. file is pub/m2/m2f-3.8.tar.gz
```

- run it again, this time with
  - `sh -x ./autoftp.sh autoftprc`
  - trace though the output and the script code
  - examine both carefully and slowly