Warning: These notes are not complete, it is a Skelton that will be modified/add-to in the class. If you want to us them for studying, either attend the class or get the completed notes from someone who did

EECS2301

Linux/Unix
Part 3

These slides are based on slides by Prof. Wolfgang Stuerzlinger at York University

Example

```
for SCRIPT in /path/to/scripts/dir/*
do
        if [ -f $SCRIPT -a -x $SCRIPT ]
        then
           $SCRIPT
        fi
done
```

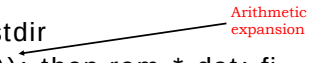
Testing

```
#!/usr/bin/bash
# cookbook filename: strvsnum
#
# the old string vs. numeric comparison dilemma
#
VAR1=" 05 "
VAR2="5"
printf "%s" "do they -eq as equal? "
if [ "$VAR1" -eq "$VAR2" ]
then
echo YES
else
echo NO
fi
printf "%s" "do they = as equal? "
if [ "$VAR1" = "$VAR2" ]
then
echo YES
else
echo NO
fi
```

```
$ bash strvsnum
do they -eq as equal? YES
do they = as equal? NO
$
```

Testing– Dealing with failures

- You want to do 2 commands, but the second one depends on the success of the first `cd testdir then rm *.dat`
- One solution is to use the double ampersand operator (run the second only if the first succeed
- `$cd testdir 2>/dev/null && rm *.dat`
OR
- `cd testdir`
- `if(($?)); then rem *.dat; fi`



Testing– Dealing with failures

- Another way is to set the –e option exit the first time encounter error (i.e. a non zero exit status) from any command in the script except while loops and if statement
- set –e
- cd testdir
- rm *.dat

Conditions

- We want to do more than just execute other
- programs
- *command1* **&&** *command2*
- executes command1 - if command1 has an exit
- status of 0 (true), then command2 is executed
- Like C, this is short-circuiting

Conditions

- We have an ‘or’ operator as well:
- *command1* **||** *command2*
- executes command1 - if command1 has an exit
- status of non-zero (false), then command2 is
- executed
- Note that there is no space between the characters in ‘||’ and ‘&&’

Looping

- for *variable* in *list_of_items*
- do
- *command1*
- *command2*
- ...
- *last_command*
- done

Looping

- for filename in *
- do
- echo $filename
- done

- for filename in *.doc
- do
- echo "Copying $filename to $filename.bak"
- cp $filename $filename.bak
- done

Looping

- for i in 1 2 3 4 5 6 7 8 9 10
- do
- echo -n "...$i"
- done
- echo # Clean up for next shell prompt

Looping

```
# Counts by looping for a fixed number of times
# Note do on same line requires semicolon.
for i in 1 2 3 4 5 6 7 8 9 10; do
    echo -n "...$i"
done
echo    # Output newline
```

```
Counts by looping for a fixed number of times
# Note do on same line requires semicolon.
for i in 1 2 3 4 5 6 7 8 9 10; do
    echo -n "...$i"
done
sleep 5
echo    # Output newline
```

Looping

```
# Counts backwards
for i in 10 9 8 7 6 5 4 3 2 1
do
    echo -n "...$i"
done
echo    # Output new line
echo "Blast off!"
$ sh counter2
...10...9...8...7...6...5...4...3...2...1
Blast off!
```

Looping

```
for x in hello there world
do
echo next word is $x
done
```

- Output:
- **next word is hello**
- **next word is there**
- **next word is world**

Looping

- Use outputs of another program as the word list using back-quotes
- `for user in `cut -d: -f1 < /etc/passwd`
- `do`
- `echo –n "$user:"`
- `finger $user`
- `done`

Looping

```
# C-language-like for loop.
# Must be run with bash.
max=10
for ((i=1; i <= max ; i++))
do
    echo -n "$i..."
done
echo
```

Redirection

- What is that?
- ls /fred > /dev/null 2> /dev/null

While

- Example: reads every line from stdin
- `while read l`
- `do`
- `echo line: $l`
- `done`

While

- Reads from a file instead
- `while read line`
- `do`
- `echo line: $line`
- `done <file`
- Or run in subshell
- `(while read line; do; echo line:$line; done) <file`

Until

- Same as “while” but test is inverted
- `until test-cmd`
- `do`
- `command`
- `…`
- `done`
- Execute ‘command’ while ‘test-cmd’ is false

Command line argument

- Special form of ‘for’ that implicitly loops over all
- command line arguments to script
- `for x`
- `do`
- `… x loops over all arguments …`
- `done`

Break and Continue

- Usual loop “escape” mechanisms:
- **break** *[n]*
- **continue** *[n]*
- The optional integer n specifies how many levels
- should be “broken” or “continued”.

case ... esac

- Like a “switch” statement
- **case** *string* **in**
- *expr1* **)**
- *command* **;;**
- *expr2* **)**
- *command* **;;**
- **…**
- **esac**

case ... esac

- Note that each case must end with ‘**;;**’
- Unlike C: no ‘fall-through’
- Take first matching case then skip to bottom
- Expressions are special - wildcards plus ‘**|**’, where
- ‘**|**’ - means “or”
- **"hello|goodbye"** matches
- “hello” or “goodbye”

Example

- Mycal program In class discussion

```
#!/cs/local/bin/sh

case $# in
0)    set `date`; m=$2; y=$6;;
1)    m=$1; set `date`; y=$6;;
2)    m=$1; y=$2;;
esac

case $m in
jan*|Jan*)      m=1;;
feb*|Feb*)      m=2;;
mar*|Mar*)      m=3;;
apr*|Apr*)      m=4;;
may*|May*)      m=5;;
jun*|Jun*)      m=6;;
jul*|Jul*)  m=7;;
aug*|Aug*)      m=8;;
sep*|Sep*)      m=9;;
oct*|Oct*)      m=10;;
nov*|Nov*)      m=11;;
dec*|Dec*)      m=12;;
[1-9]|10|11|12) ;;
*)              y=$m;m="";;
esac
/usr/bin/cal $m $y
```

```
sh-4.1$ sh_case.sh
     March 2016
Su Mo Tu We Th Fr Sa
       1  2  3  4  5
 6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

sh-4.1$ sh_case.sh march
     March 2016
Su Mo Tu We Th Fr Sa
       1  2  3  4  5
 6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

sh-4.1$ sh_case.sh march 2016
     March 2016
Su Mo Tu We Th Fr Sa
       1  2  3  4  5
 6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
```

Shift

- Built-in command:
- **shift** “moves” all arguments down 1
- **$2** is moved into **$1**, **$3** is moved into **$2**, etc.
- **$1** is thrown away

Shift

- #!/bin/sh
- while [$# -gt 0]; do
- echo "processing arg: $1"
- shift
- done

Shell Functions

- We can also write functions in the shell
- *name***() {**
- commands …
- **}**
- Parentheses '()' are always empty
- Note: no return type, no arguments declared
- Call via:
- *name [arg] [arg] …*

Shell Functions

- Shell functions can take any number of arguments
- and return an exit status
- Arguments use the command-line argument syntax
- (**$1**, **$2**, **…** etc)
- • **shift** works here as well!
- Return the exit status of the function

Shell Functions

```
allfiles() {
# true if all args are files
for x in $*; do
    if [ ! -f $x ]; then
   return 1
fi
done
return 0
}
```

Shell Functions

- A function must be defined before we can use it
- We call it like any other command
- **allfiles file1 dir1 file2**
- No parentheses in function call
- • Effectively creates a new (temporary) shell
- command

Shell Functions

```
#!/bin/sh
inc_A() {
        # Increment A by 1
        A=`expr $A + 1`
}
A=1
while [ $A -le 10 ]
do
        echo $A
        inc_A
done
```

Shell Functions

```
#!/bin/sh
x="1111"
f1() {
x="Hello"
echo from function $x
}
f1
echo from main $x
```

from function Hello
from main 111

Environmental variables

- All shell variables are local to the shell
- To change any *environment* variable need to "**export**" them.
- Env. variables visible in programs via etenv(3c).
- Syntax:
- *variable*=*value* -- normal assignment
- **export** *variable*
- Shell command "**env**" lists all env. variables