

IBS574 – P45 Grace Crum Rollins Building

# Linux shell & shell scripting - II

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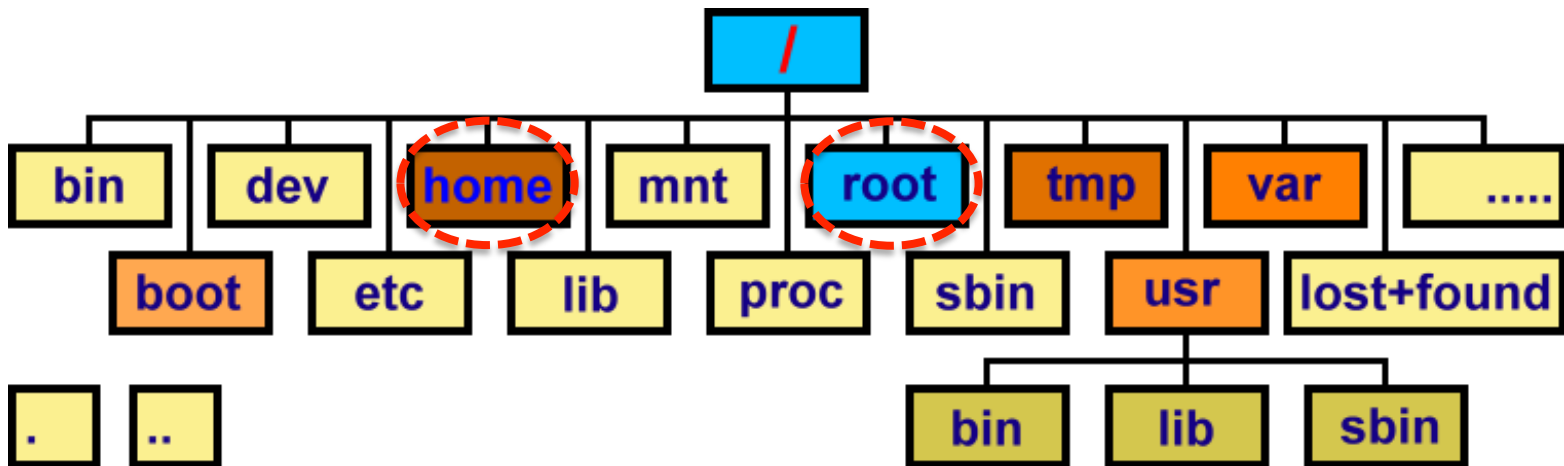
# Console/Terminal

- Shell prompt will usually include

[root@machinename ~]# /root

[user\_name@machinename ~]\$ /home/user\_name

- Linux file system hierarchy



Easiest way to do this is ...

**Lets start our second lab!**

# Shell script

- A shell script is a file that contains ASCII text.
- To create a shell script, use a *text editor*.

Usage: `mkdir project/{data, script, out}`

project/data

project/script

project/out

Usage: `cd project/script`

# Create/Edit text files

Choose a text editor: emacs, Vim

Usage: `vi hello.sh`

**INSERT** mode:

press keys like `i` OR `a` & start typing.

"i" will let you insert text just before the cursor.

"I" inserts text at the beginning of the current line.

"a" will let you insert text just after the cursor, and

"A" will let you type at the end of the current line.

# Create/Edit text files

Type the following text:

```
#!/bin/sh  
# My first script  
echo "Hello World!"
```

**“#!/bin/sh”** a special clue given to the shell indicating what program is used to interpret the script.

# Create/Edit text files

Type the following text:

```
#!/bin/sh  
# My first script  
echo "Hello World!"
```

```
#!/bin/bash  
#!/usr/bin/perl  
#!/usr/bin/Rscript  
#!/usr/bin/env python
```

“**#!/bin/sh**” a special clue given to the shell indicating what program is used to interpret the script.

# Create/Edit text files

SAVE mode:

press **esc** key AND

**q!** for not to save OR

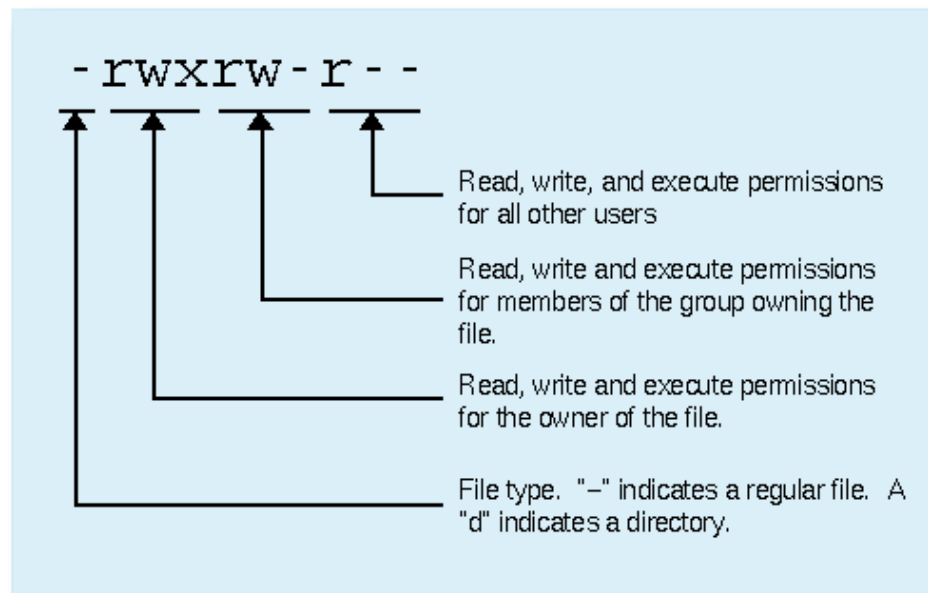
**x** to save all typed content.



# “chmod”

- Change the permissions of files
  - **Read (r)**, **write (w)**, and **execute (x)**
  - 3 types of users (user, group & other)

Usage: ls -l



# “make file executable”

- **To make it executable**

Usage: `chmod +rwxr-xr-x hello.sh`

Usage: `chmod +x hello.sh`

Usage: `sh hello.sh`

- **To make it un-executable**

Usage: `chmod -x hello.sh`

# “make file executable”

- **To make it executable** +755

Usage: `chmod +rwxr-xr-x hello.sh`

Usage: `chmod +x hello.sh`

Usage: `sh hello.sh`

- **To make it un-executable**

Usage: `chmod -x hello.sh`

# Variables in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
```

```
# My first script
```

```
i=22
```

```
echo "Hello, I am " $i
```

```
# echo "Hello, I am $i"
```

Usage: `sh hello.sh`

# Variables in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh  
# My first script  
i=22  
j="Hello, I am "  
echo $i $j
```

Usage: `sh hello.sh`

# Conditions in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# My first script
PASS="test1234"
if [ $PASS == "test1234" ]; then
    echo "Correct pass word!!"
fi
```

Usage: `sh hello.sh`

Remember that the spacing is very important in the if statement.

# Conditions in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# My first script
PASS="test123"
if [ $PASS == "test1234" ]; then
    echo "Correct pass word!!"
else
    echo "enter correct pass word!!"
fi
```

Usage: `sh hello.sh`

# String Comparison Operators

Operator	Description	Example
= or ==	Is Equal To	if [ "\$1" == "\$2" ]
!=	Is Not Equal To	if [ "\$1" != "\$2" ]
>	Is Greater Than (ASCII comparison)	if [ "\$1" > "\$2" ]
>=	Is Greater Than Or Equal To	if [ "\$1" >= "\$2" ]
<	Is Less Than	if [ "\$1" < "\$2" ]
<=	Is Less Than Or Equal To	if [ "\$1" <= "\$2" ]
-n	Is Not Null	if [ -n "\$1" ]
-z	Is Null (Zero Length String)	if [ -z "\$1" ]



# Integer Comparison Operators

Operator	Description	Example
-eq	Is Equal To	if [ \$1 -eq 200 ]
-ne	Is Not Equal To	if [ \$1 -ne 1 ]
-gt	Is Greater Than	if [ \$1 -gt 15 ]
-ge	Is Greater Than Or Equal To	if [ \$1 -ge 10 ]
-lt	Is Less Than	if [ \$1 -lt 5 ]
-le	Is Less Than Or Equal To	if [ \$1 -le 0 ]
==	Is Equal To	if (( \$1 == \$2 ))
!=	Is Not Equal To	if (( \$1 != \$2 ))
<	Is Less Than	if (( \$1 < \$2 ))
<=	Is Less Than Or Equal To	if (( \$1 <= \$2 ))
>	Is Greater Than	if (( \$1 > \$2 ))
>=	Is Greater Than Or Equal To	if (( \$1 >= \$2 ))

# “for” loop in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# My first script
for i in {1..10}
do
    echo $i
done
```

Usage: `sh hello.sh`

# “for” loop in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/bash  
arr=('A' 'B' 'C' 'D' 'E')  
for i in {0..4}  
do  
    echo $i  
    echo ${arr[$i]}  
done
```

Usage: `./hello.sh`

# “for” loop in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/bash
```

```
arr=('A' 'B' 'C' 'D' 'E')
```

```
for i in {0..4}
```

```
do
```

```
    echo $i
```

```
    echo ${arr[$i]}
```

```
done
```

`chmod +x hello.sh`

Usage: `./hello.sh`

# “for” loop in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# My first script
for i in 1 2 3 x y z
do
    echo $i
done
```

loop indices  
doesn't have to  
be just numbers

Usage: `sh hello.sh`

# “while” loop in Linux/Shell

Usage: vi hello.sh

```
#!/bin/sh
# My first script

i=0
while [ $i -le 5 ]; do
    # echo “before $i”
    i=$(( $i+1 ))
    echo “after $i”
done
```

Usage: sh hello.sh

# Functions in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# function definition
add_a_user()
{
    USER=$1
    PASS=$2
    echo "Passwd $PASS created for $USER on $(date)"
}
# function call
echo $(add_a_user bob letmein)
```

Usage: `sh hello.sh`

# Functions in Linux/Shell

Usage: `vi hello.sh`

```
#!/bin/sh
# function definition
add_a_user()
{
    USER=$1
    PASS=$2
    echo "Passwd $PASS created for $USER on $3"
}
# function call
echo $(add_a_user bob letmein "$(date)")
```

Usage: `sh hello.sh`



# download a fastq file

Usage: `cd projects/data`

wget

<https://github.com/CGATOxford/UMI-tools/releases/download/v0.2.3/example.fastq.gz>

- **View**

Usage: `zcat example.fastq.gz | head`

- **Check file size**

Usage: `ls -lh example.fastq.gz`

- **Count number of sequences in a fastq file**

Usage: `grep -c "^>" example.fastq.gz`

# “Calculate the length of reads”

Create the following file at project/script

Usage: `vi fastq.sh`

```
#!/bin/sh
# using awk

zcat ../data/example.fastq.gz | \
awk '{if(NR%4==2) print length($1)}' ../out/length.txt

# Rscript /home/user_name/script/hist.R
```

Usage: `sh fastq.sh`

# “Calculate the length of reads”

Create the following file at project/script

Usage: `vi hist.R`

```
t.dat <- read.table('/home/user_name/out/length.txt')  
jpeg('/home/user_name/out/rplot.jpg')  
hist(t.dat[,1])  
dev.off()
```

Usage: `sh fastq.sh`

# “Calculate the length of reads”

Create the following file at project/script

Usage: `vi hist.R`

```
#!/usr/bin/Rscript
t.dat <- read.table('/home/user_name/out/length.txt')
jpeg('/home/user_name/out/rplot.jpg')
hist(t.dat[,1])
dev.off()
```

Usage: `chmod +x hist.R`

Usage: `./hist.R`

*Practice Makes Perfect*

