

# Filesystem.

Jan Trdlička

Department of Computer Systems  
Faculty of Information Technology  
Czech Technical University in Prague

*trdlicka@fit.cvut.cz*

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# Discussion of homework

- Create a shell script `list3.bash` that requires one argument.
  - If the argument is missing or if there are more arguments, then the script prints the following error and exits with exit status 1.

```
Usage: ./list3.bash directory_name
```

- If the argument is a name of a directory and the directory is readable, then the scripts counts the number of subdirectories of this directory and prints this information in the following format:

```
$> ./list3.bash /etc/init.d/rc0.d/  
/etc/init.d/rc0.d/: no subdirectory
```

```
$> ./list3.bash /usr/bin/  
/usr/bin/: 1 subdirectory
```

```
$> ./list3.bash /etc  
/etc: 134 subdirectories
```

# Discussion of homework

```
#!/bin/bash

#--- Checking Arguments ---
if [ $# != 1 ]
then
    echo "Usage: $0 directory_name" >&2
    exit 1
fi

if [ -d "$1" -a -r "$1" ]
then

    #--- Count subdirectories ---
    count=0
    for i in "${1%/}/"/*           # man bash -> section "Parameter Expansion"
                                   # see "Remove matching suffix pattern"
    do
        if [ -d "$i" ]
        then
            ((count++))
        fi
    done

    #--- Print summary ---
    case "$count" in
        0) echo "$1: no subdirectory" ;;
        1) echo "$1: 1 subdirectory" ;;
        *) echo "$1: $count subdirectories" ;;
    esac
fi
```

# Getting information about filesystem

- How to get information about the filesystem?
  - Using commands: `df` or `mount`.
- How to determine the size of the root file system on server `fray1.fit.cvut.cz`?
  - `df -h`
- How to determine free space of the file system on the server `fray1.fit.cvut.cz`, where your home directory is located?
  - `echo "$HOME" ; df -h`
- How to determine the IP address of server, where the contents of your home directory from server `fray1.fit.cvut.cz` is located?  
Hint: use command `ping` to get IP address of server.

- `echo "$HOME" ; df -h ; ping -a fsun`

# Getting information about directory/file

- How to get information about the directory/file?
  - Using commands: `pwd`, `ls`, `stat` or `du`.
  - Using shell variables: `PWD` or `HOME`.
- Login to the server `fray1.fit.cvut.cz` and change working directory to directory `/bin`. Explain output of the following commands.

```
echo "$PWD"
```

```
pwd
```

```
pwd -P
```

- How to list names of all directories/files in you home directory?
  - `ls -a "$HOME"`
- How to list names and attributes of all directories/files in you home directory? Explain the meanings of attributes.
  - `ls -al "$HOME"`

# Getting information about directory/file

- How to list attributes of the root directory?

- `ls -ld /`

- Login to server `fray1.fit.cvut.cz`. How to determine i-node numbers of the following files

- `/etc/init.d/pppd,`
  - `/etc/rcS.d/K50pppd,`
  - `/etc/rc0.d/K50pppd,`
  - `/etc/rc1.d/K50pppd.`

- `ls -i /etc/init.d/pppd /etc/rc?.d/K50pppd`

- Why the previous files have the same i-node number?  
What does it mean?

- They are hard links.

- How much disk space is allocated for contents of these files totally?

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# Getting information about directory/file

- What kind of information about your home directory can be display by commands `ls` and `stat`. Compare these commands.
  - `man ls`
  - `man stat`
- How to determine number of kilobytes which are allocated for your home directory?
  - `du -ks "$HOME"`



# Getting information about file contents

- How to get information about file contents?
  - Using commands: `file`, `ldd` or `nm` .
- Login to the server `fray1.fit.cvut.cz`. Determine type of the following commands:
  - `pkgdiff`
  - `7z`
  - `firefox`

If the command is an ELF dynamically linked file, then determine shared libraries used by this command.

If the command is a script, then determine script interpreter.

```
type pkgdiff ; file /usr/bin/pkgdiff
less /usr/bin/pkgdiffhead
```

```
type 7z ; file /usr/bin/7z
ldd /usr/bin/7z
```

```
type firefox ; file /opt/local/bin/firefox
less /opt/local/bin/firefox
```

# Viewing the file contents

- How to display the file contents?
  - Using commands: `cat`, `more/more` or `od` .
- Command `ls -l` print several columns to the standard output.  
How to determine the column separator?

```
ls -l / | od -c
```

- How to determine the number of nonempty lines in manual page of `bash`?  
Hint: use command `cat`.

```
man bash | cat -b
```

- How to determine the number of empty lines in manual page of `bash`?  
Hint: use command `cat`.

```
man bash | cat -b  
man bash | cat -n
```

# Creation of directory/file

- How to create directory/file?
  - Using commands: `mkdir`, `touch`, `ln`.
  - Using metacharacters: `>` or `>>` .
- Login to the server `fray1.fit.cvut.cz`.  
How to create the following directories/files in your home directory?

- `PS1_lab05/A/B/C` ... directories

```
mkdir -p "$HOME/PS1 lab05/A/B/C"
```

- `PS1_lab05/java` ..... link to `/opt/java`

```
ln -s /opt/java "$HOME/PS1 lab05/java"
```

- `PS1_lab05/.hl-profile` ..... hard link to `$HOME/.profile`

```
ln "$HOME/.profile" "$HOME/PS1 lab05/.hl-profile"
```

- How to add line `PS1="$PATH:$HOME/bin"` to file `$HOME/.profile`?

```
echo 'PATH="$PATH:$HOME/bin"' >> "$HOME/.profile"
```

# Manipulation with directories/files

- How to manipulate with directories/files?

- Use commands: `cp`, `mv`, `rm`, `rmdir`.

- Login to the server `fray1.fit.cvut.cz`.

How to create the following directories/files in your home directory?

- `PS1_lab05/group` ... copy of `/etc/group`

```
cp /etc/group "$HOME/PS1_lab05"
```

- `PS1_lab05/init` ..... copy of `/etc/init.d`

```
cp -r /etc/init.d "$HOME/PS1_lab05/init"
```

- How to rename `PS1_lab05/init` to `PS1_lab05/init.d`?

```
mv "$HOME/PS1_lab05/init" "$HOME/PS1_lab05/init.d"
```

- How to delete `PS1_lab05/init.d`?

```
cd "$HOME/PS1_lab05/init.d" ; rm -r *  
cd .. ; rmdir "$HOME/PS1_lab05/init.d"
```

# Homework

- Create shell script, which
  - 1 creates the following directory tree temp-RRMMDD where RR are the last two digits of the current year (00..99), MM is the number of the current month (01..12) and DD is the number of the current day (01..31),
  - 2 copies to this directory any three files s1..s3,
  - 3 lists files in directories and determines their type,
  - 4 removes this directories.

