CST8177 – Linux II

Review of Fundamentals (cont'd)

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Topics

- change your password on CLS if you haven't already
- the filesystem
- access permissions
- symbolic links
- hard links

Variables

- Variables for general use (variables that are not environment variables) have lower case names
- Environment variables are indicated by their UPPER CASE names: SHELL, VISUAL, etc
- It's usually best to put variable expansions inside double quotes, to protect any special characters that might be inside the variable:

echo "$somevar"

  - if somevar contained the * character, the double quotes stop the shell from globbing it

Setting Variables

- set the variable `myvar` to have value `value`

```
myvar=value
```

- Note, to make this variable setting visible in sub processes we use `export`

```
export myvar=value
```

or

```
myvar=value
export myvar
```

Variable setting for command

- set the `myvar` variable to have a null value, then run the `value` command with that variable setting in effect

```
myvar= command
```

- Notice that if you try mistakenly use this to try to set the value of `myvar to value`

```
myvar= value
```

in this case you are actually trying to run a command called `value`

Variable setting for command (cont'd)

The usual way to use this mechanism is something like

```
VISUAL=nano vipd
```

- This means to set the value of the environment `VISUAL` variable to `nano`, and use that while the `vipd` command runs

Setting Variables Mistakes

- set the `myvar` variable to have a null value, then run the `value` command with that variable setting in effect

```
myvar= value
```

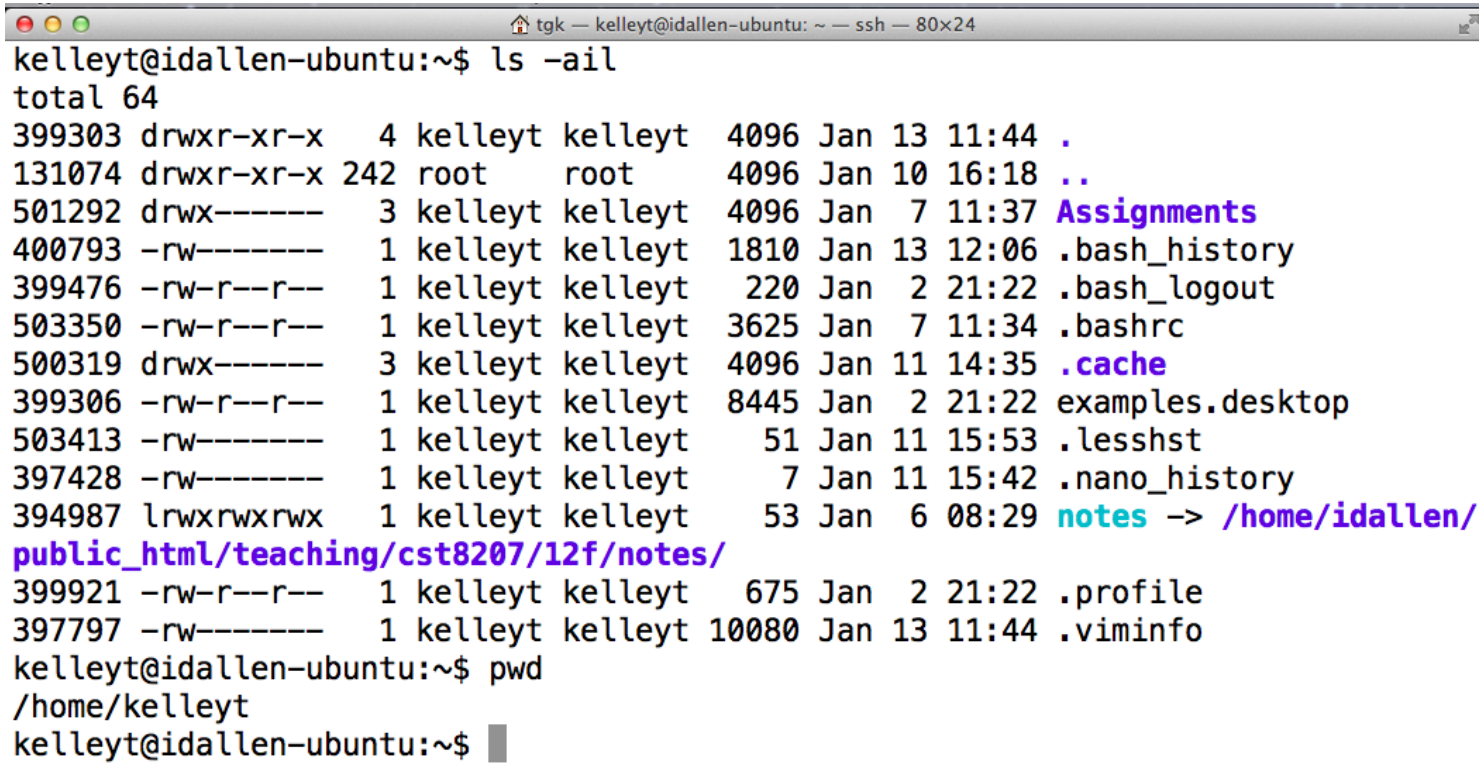
- run the `myvar` command with one argument, namely `=value`

```
myvar =value
```

- run the `myvar` command with two arguments, namely `=` and `value`

```
myvar = value
```

File Permissions



Typical directory and file

inode 399303 drwxr-xr-x access time modification time change time …etc…	
.	inode 399303
..	inode 131074
examples.desktop	inode 399306
Assignments	inode 501292
…etc…	…etc…

inode 399306
-rw-r--r--
access time
modification time
change time
…etc…

data blocks for the file
there is no filename here
the filename(s) (at least one) are stored in directories

File Permissions (cont'd)

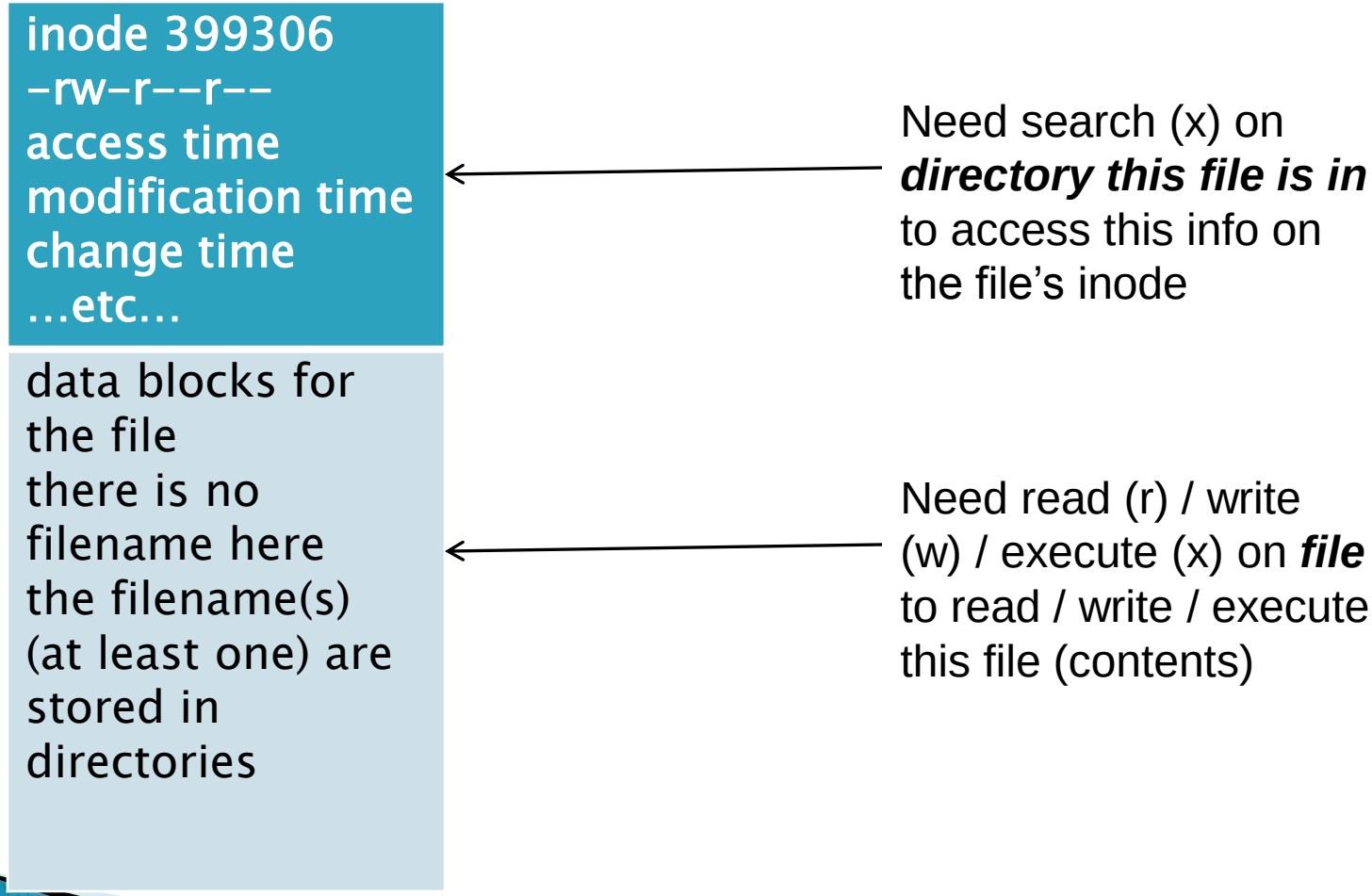
inode 399303 drwxr-xr-x access time modification time change time …etc…	
.	inode 399303
..	inode 131074
examples.desktop	inode 399306
Assignments	inode 501292
…etc…	…etc…

Need read (r) on directory to read this column

Need search (x) on directory to access this column

Need write (w) ***and*** search (x) on directory to change first column

File Permissions (cont'd)



File Attributes

Field No.	Stat Name	Unix	Win98/NT	MacOS
1	st_dev	Device number of filesystem	Drive number	vRefNum
2	st_ino	Inode number	Always 0	fileID/dirID
3	st_mode	File mode	File mode	777 dirs/apps; 666 docs; 444 locked docs
4	st_nlink	Number of links to the file	Number of link (only on NTFS)	Always 1
5	st_uid	Owner ID	Always 0	Always 0
6	st_gid	Group ID	Always 0	Always 0
7	st_rdev	Device ID for special files	Drive No.	Always 0
8	st_size	File size in bytes	File size in bytes	Data fork file size in bytes
9	st_blksize	Preferred block size	Always 0	Preferred block size
10	st_blocks	Number of blocks allocated	Always 0	Number of blocks allocated
11	st_atime	Last access time since epoch	Last access time since epoch	Last access time -66 years
12	st_mtime	Last modify time since epoch	Last modify time since epoch	Last access time -66 years
13	st_ctime	Inode change time since epoch	File create time since epoch	File create time -66 years

Extending Unix

- create a command with basic scripting
  - put "#!/bin/sh -u" at very beginning of file
  - put commands in file
  - make file executable

- put the file in a directory that is in $PATH
- http://teaching.idallen.ca/cst8207/13f/notes/400_search_path.html

- Not a good idea to put "." in PATH
- Security implications of putting "current directory" , "." in PATH
- `PATH=.:$PATH`
- demonstration of how the bad guy can arrange for you to inadvertently run their malicious commands as you