2014-04-25.sagews

April 25, 2014

Contents

1 Math 480b Sage Course

1.1 The Command Line Terminal

1.2 April 25, 2014

Screencast: REMEMBER!!!!!! (with sound)

Plan

- Homework your grading of hw3 is due today at 6pm. I will collect and redistribute it by Saturday morning so at least youll get some feedback on your project. your hw4 is due Sunday at 6pm.
- Go over hw5 (new homework).
- Lecture today on Command Line Terminal

```
something = 5
if isinstance(something, (int, long, Rational, Integer)):
    print "yes!"
```

```
yes!
```

1.3 The Command Line

- We will talk about bash (=bourne again shell), which is by far the most popular.
- This is what you get when you click +New¿Command Line Terminal in SMC. Its also what you get when you open a terminal on Linux or OS X. It is NOT what you get when you open cmd.exe on Windows.

- You can execute all of the (non-interactive) commands we will mention here in a Sage worksheet or from the sage command-line terminal or from an IPython notebook by preceeding them with !

```
!pwd
/projects/74af30b7-ad25-4308-a02e-c71fcd84de6e/sage2014/lectures/2014-04-25
```

```
!ls
2014-04-25.sagews
```

- You type stuff at a prompt and output appears. The command line terminal is extremely powerful. It mostly solves a similar problem to OS Xs finder and other file explorers, but in a completely different way. Some things that are very hard in a graphical UI become utterly trivial in the command line, and conversely.
- The most import basic commands: memorize these
  - pwd = print working directory (where you are like the folder you are browsing)
  - ls = list the files in the working directory
  - cd path = change ddirectory; use forward slashes. Use .. to go up.
  - mv src1 src2 ... dest = move a file (or files) or directory from one place to another (in particular, rename)
  - cp src1 src2 ... dest = copy a file from one place to another; use cp -r to recursively copy a directory
  - mkdir path = make directory
  - rm path = remove a file; or the much more dangerous rm -rf path = delete it if at all possible.
  - man command = manual about how to use a command

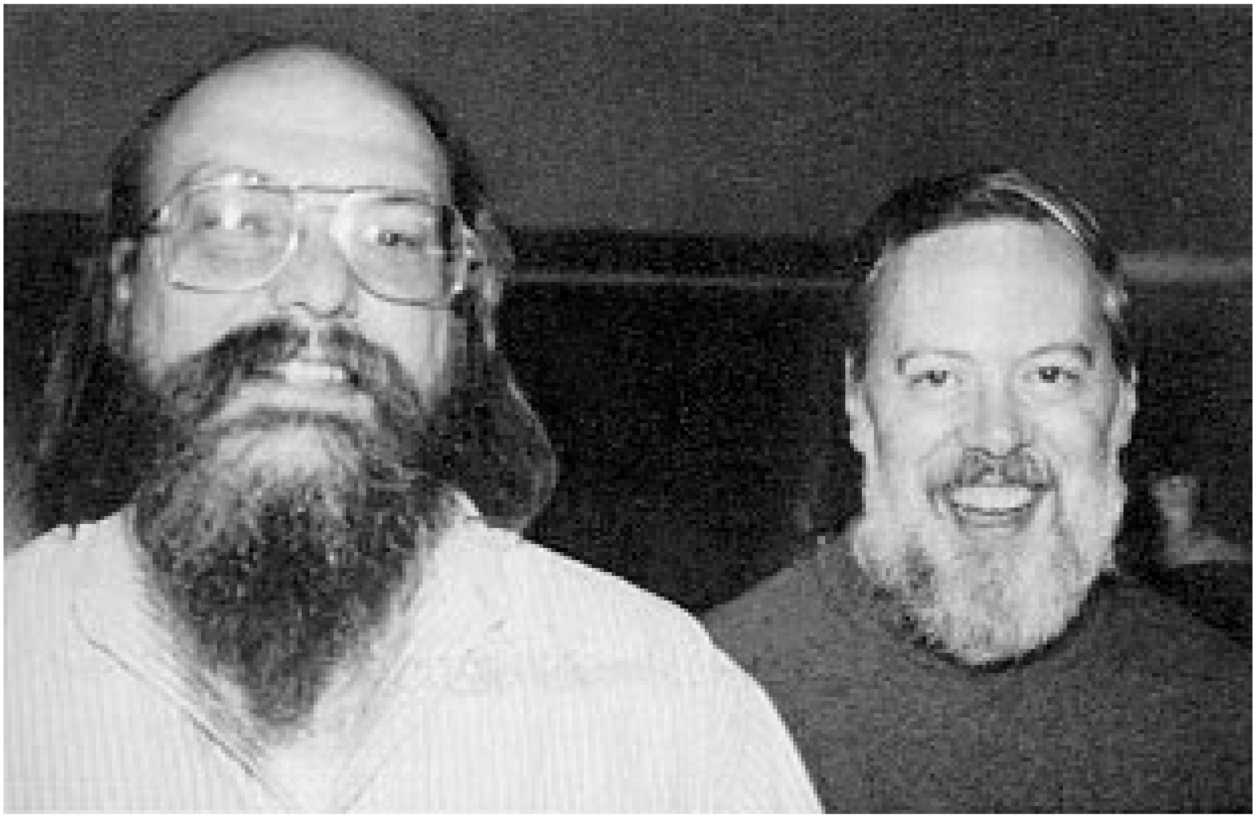
- Illustrate each of these in a terminal. (NOTE: In SMC, the terminal history currently vanishes after a while this will likely change though.)

1.4 History

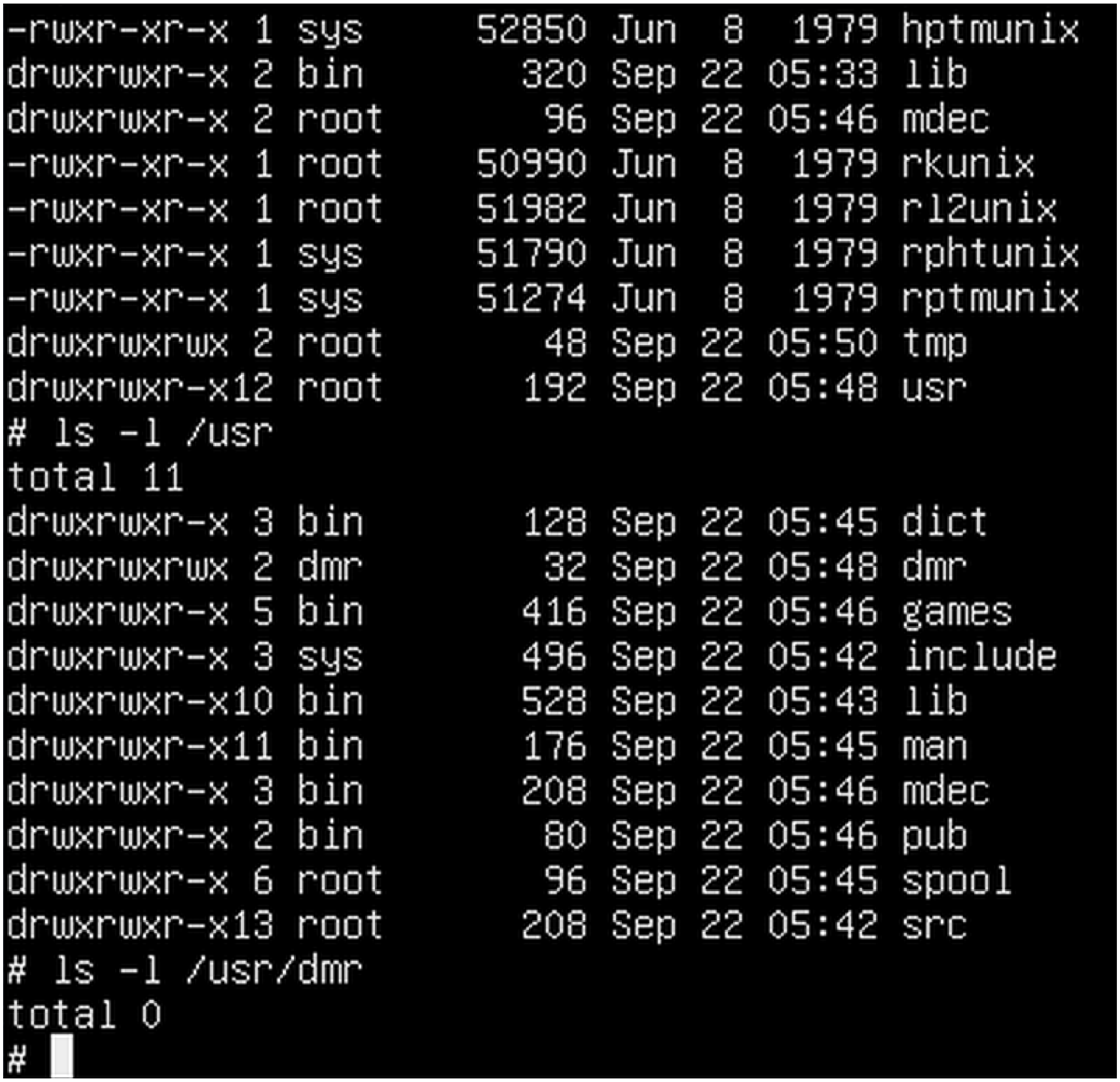
- get it with the up and down arrows.
- type history to see it.
- type ![number] to re-run the numbered command.

1.5 History

```
# These guys created Unix in the 70s...
salvus.file("Ken_n_dennis.jpg")
```



```
# Actual 1979 Unix (Version 7) running:
salvus.file("unix1979.png")
```



```
-rwxr-xr-x 1 sys     52850 Jun  8  1979 hptmunix
drwxrwxr-x 2 bin       320 Sep 22 05:33 lib
drwxrwxr-x 2 root       96 Sep 22 05:46 mdec
-rwxr-xr-x 1 root    50990 Jun  8  1979 rkunix
-rwxr-xr-x 1 root    51982 Jun  8  1979 rl2unix
-rwxr-xr-x 1 sys     51790 Jun  8  1979 rphtunix
-rwxr-xr-x 1 sys     51274 Jun  8  1979 rptmunix
drwxrwxrwx 2 root       48 Sep 22 05:50 tmp
drwxrwxr-x12 root      192 Sep 22 05:48 usr
# ls -l /usr
total 11
drwxrwxr-x 3 bin       128 Sep 22 05:45 dict
drwxrwxrwx 2 dmr        32 Sep 22 05:48 dmr
drwxrwxr-x 5 bin       416 Sep 22 05:46 games
drwxrwxr-x 3 sys       496 Sep 22 05:42 include
drwxrwxr-x10 bin       528 Sep 22 05:43 lib
drwxrwxr-x11 bin       176 Sep 22 05:45 man
drwxrwxr-x 3 bin       208 Sep 22 05:46 mdec
drwxrwxr-x 2 bin        80 Sep 22 05:46 pub
drwxrwxr-x 6 root       96 Sep 22 05:45 spool
drwxrwxr-x13 root      208 Sep 22 05:42 src
# ls -l /usr/dmr
total 0
# 
```

```
# It looks similar 35 years later!
!ls -l /usr
```

```
total 184
drwxr-xr-x   2 root root 69632 Apr 25 13:56 bin
drwxr-xr-x   2 root root  4096 Mar  2 02:21 games
drwxr-xr-x 107 root root 20480 Mar 25 05:59 include
drwxr-xr-x 159 root root 45056 Apr 25 13:56 lib
drwxr-xr-x   3 root root  4096 Jan 16 03:43 lib32
drwxr-xr-x   3 root root  4096 Apr 25  2013 libexec
drwxr-xr-x  13 root root  4096 Nov 27 05:54 local
drwxr-xr-x   2 root root 12288 Apr  9 22:20 sbin
drwxr-xr-x 237 root root 12288 Mar 25 05:59 share
drwxr-xr-x  12 root root  4096 Mar 20 03:04 src
```

1.6 What makes the terminal so powerful

- Use tab completion (in the actual terminal) to complete file names
- You can use patterns to specify the files or directories that are arguments to commands
- You can redirect the input or output of a command.
- You can combine commands together via pipes (sort of like composing functions).
- You can temporarily pause (control-Z) and restart (fg) commands (and much more).
- There are thousands (!) of additional commands like the above, which all work in a uniform way: cal 2014, grep, du,

Slowly and carefully illustrate the above points using the following commands:
ls, grep, du, find, man , sage, ipython, gp, git

1.7 Summary of key ideas

- The man command documents every command
- Use patterns to specify filenames
- Use foo [...] — bar [...] to make the output of foo be the input to bar
- Use foo [...] output_file to redirect the output of foo to the given file, and Use foo [...] input_file to make input to foo come from the given file.
- The most important commands are: man, ls, cd, mv, cp
- When you figure out how to do something, write down the command line that does it somewhere. You can paste it in later, or tell other people about it and it is very highly likely to work forever, since UNIX is quite stable (over many decades).

Other: In SMC (and OS X), you can open a file or folder in the graphical interface by typing open filename