Unix command line; editors
Tools for Reproducible Research

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```
kbroman.org
github.com/kbroman
@kwbroman
```
Course web: `kbroman.org/Tools4RR`

Windows vs. Mac OSX vs. Linux

Remote vs. Not

If you use Windows...

Consider Git Bash (or Cygwin)
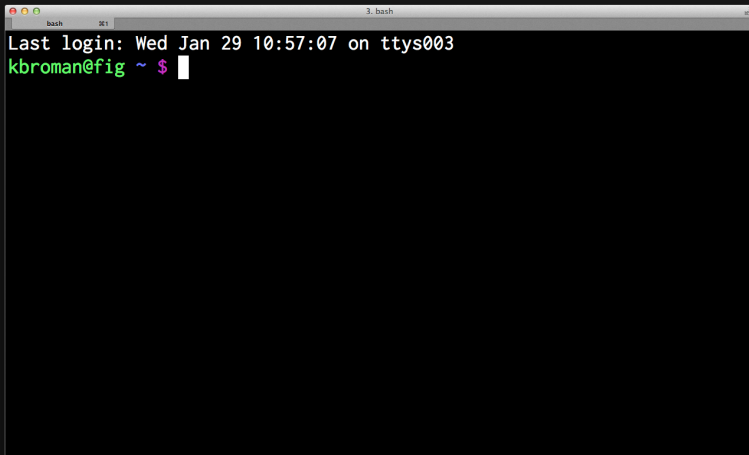
(and perhaps Mintty or ComEmu)

If you use a Mac...

Consider Homebrew and iTerm2

Also the XCode command line tools

The command line is your friend

- ► Don't touch that mouse!

- ► Scriptable

- ► Flexible

The shell

Options: tcsh, bash, zsh

Basics

- Directory structure
  Absolute vs. relative paths
  ```
  ls -l ~/Figs ../Rawdata/
  ```

- Creating, removing, changing directories
  ```
  mkdir
  rmdir
  cd
  cd -
  ```

- Moving, copying, removing files
  ```
  mv
  cp
  rm -i
  ```

~/.bash_profile

```
export PATH=.:/usr/local/bin:$PATH
export LD_LIBRARY_PATH=/usr/local/lib

noclobber=1     # prevent overwriting of files
IGNOREEOF=1     # disable Ctrl-D as a way to exit
HISTCONTROL=ignoredups

alias cl='clear;cd'
alias rm='rm -i'
alias mv='mv -i'
alias cp='cp -i'
alias ls='ls -GF'
alias 'l.'='ls -d .[a-zA-Z]*'
alias ll='ls -lh'
alias md='mkdir'
alias rd='rmdir'
alias rmb='rm .*~ *~ *.bak *.bk!'

alias Rb='R CMD build --force --resave-data'
alias Ri='R CMD INSTALL --library=/Users/kbroman/Rlibs'
alias Rc='R CMD check --library=/Users/kbroman/Rlibs'
alias Rcc='R CMD check --as-cran --library=/Users/kbroman/Rlibs'
```
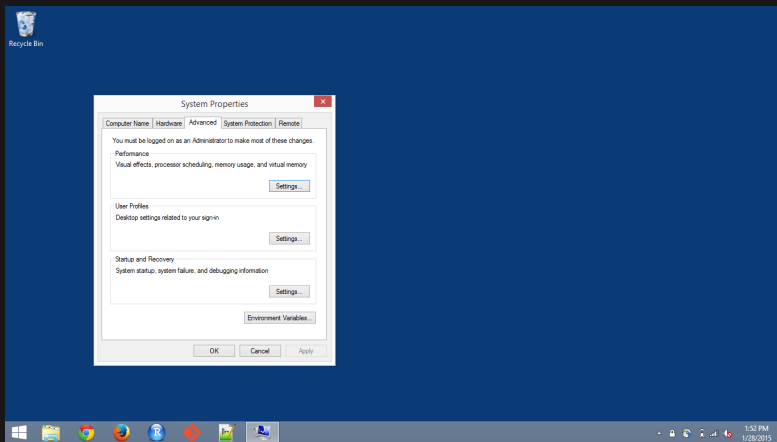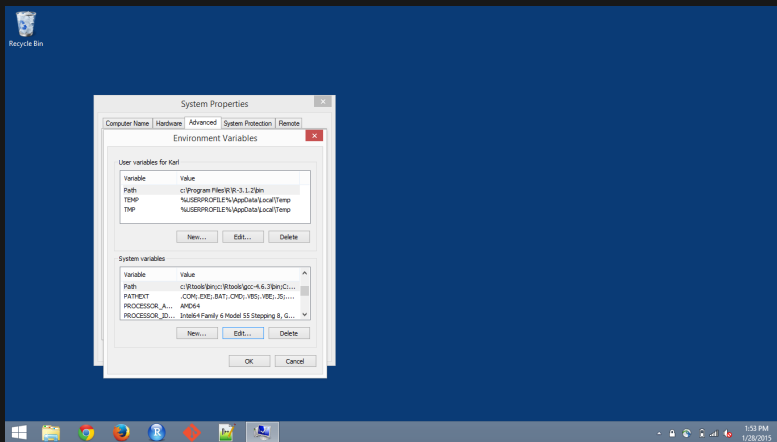
PATH in Windows

PATH in Windows

PATH in Windows

Redirection and pipes

```
$ curl -L http://bit.ly/hamlet_txt > hamlet.txt

$ wc -l hamlet.txt

$ grep Ham hamlet.txt > tmp.txt
$ wc -l tmp.txt

$ grep Ham hamlet.txt | wc -l

$ grep Ham hamlet.txt | less

$ cat file1.txt file2.txt > combined.txt
$ cat file3.txt >> combined.txt
```

Wild cards

```
$ grep blah *.txt

$ ls blah.???

$ ls [a-z]*

$ ls /usr/bin/[auz]*

$ ls /usr/bin/[auz]*.*

$ ls -l *.txt | wc -l

$ wc -l *.txt | grep total
```

Suspend/foreground/background

```
$ R CMD BATCH input.R output.txt &

$ R CMD BATCH input.R output.txt
[ctrl-Z]
$ bg

$ emacs afile.txt
[ctrl-Z]
$ fg
```

Moving around the command line

`ctrl-f, ctrl-b`	move forward and back
`ctrl-a, ctrl-e`	move to beginning and end of line
`ctrl-k, ctrl-u`	delete rest of line, or to the start
`ctrl-l`	clear the screen
`ctrl-c`	cancel what you've typed
`tab`	autocomplete command or file
`ctrl-p, ctrl-n`	forward and backward in history
`ctrl-r`	search for a previous command

How to solve computing problems

- ► Try stuff!
- ► man pages and help files
- ► `blah -h` or `blah --help`
- ► Google
- ► Stackoverflow and other StackExchange sites
- ► Google with `site:stackoverflow.com`
- ► email lists and google groups
- ► friends or colleagues
- ► Twitter
- ► Buy a book. Buy all of the books.

Examples

- How do you suppress warnings in knitr?
- What symbol corresponds to the unicode `\u00B1`?
- What's the difference between `curl` and `wget`?
- What does `"502 Bad Gateway"` mean?
- `"To open gs you need to install X11"`
- `mclapply` isn't working in Windows
- How to ping a server in Python?
- `Font shape `EU1/pplx/m/n' undefined`
- `except KeyError, k: raise AttributeError, k`

Important principle

Learn to code by looking at good code.

Choose a good editor

- Emacs

- VIM

- RStudio

- Textwrangler

- Notepad++

- Sublime Text

- Atom

A good editor

- ▶ Doesn't require pointing-and-clicking

- ▶ Easy to get code between R and a script

- ▶ Syntax highlighting of code

- ▶ Automatic indentation

- ▶ Close parentheses/brackets/braces

- ▶ Browse code across files

- ▶ Integrated with other tools (e.g., version control)

Other useful tools

```
$ find . -name *.py
$ locate article.cls

$ ps ux

$ top

$ df -hk

$ du -h
$ du -hd2

$ ln -s ~/Projects/SomeFriend/Data
$ ln -s ~/Projects/SomeFriend/Data SomeFriend_Data

$ tar xzvf qtl_1.29-2.tar.gz
$ tar czvf blah.tgz Blah/
$ tar tzvf blah.tgz
```

Further useful tools

```
$ whereis bash
$ type rm
$ type emacs

$ pwd

$ head afile.txt
$ tail afile.txt
$ head -n20 afile.txt

$ man head

$ kill 8453
$ kill -9 8453

$ history
$ !!
$ !-2
$ !503

$ ping www.google.com

$ ispell afile.txt
```

Opening a file from the command line

Windows:

```
$ start mypaper.pdf
$ start http://google.com
```

Mac:

```
$ open mypaper.pdf
$ open http://google.com
```

File modes


```
kbroman@fig ~/Teaching/Tools4RR/Lectures (master) $ ll
total 8
drwxr-xr-x  27 kbroman  staff   918B Jan 27 11:35 01_Intro/
drwxr-xr-x  30 kbroman  staff   1.0K Jan 29 11:38 02_Unix/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:28 03_KnitrMarkdown/
drwxr-xr-x  37 kbroman  staff   1.2K Jan 20 23:05 04_Git/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:28 05_Organization/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:28 06_EDA/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:28 07_ClearCode/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:28 08_Rpack/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 09_TestingDebugging/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 10_BigJobs/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 11_KnitrPapers/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 12_KnitrTalks/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 13_KnitrPosters/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 14_Python/
drwxr-xr-x   2 kbroman  staff    68B Jan 14 06:29 15_Licenses/
-rwxr-xr-x   1 kbroman  staff   488B Oct 23 16:18 createVersionWithNotes.rb*
kbroman@fig ~/Teaching/Tools4RR/Lectures (master) $
```

File modes/owner/group

```
sudo chown kbroman .
chgrp -R staff .
chmod +x createVersionWithNotes.rb
chmod 755 02_Unix
chmod 644 02_Unix/02_unix.tex
chmod 700 Private_stuff
```

Don't forget to look at the resources page

`kbroman.org/Tools4RR/pages/resources.html`