

Training Session 1: UNIX/Linux, Emacs and ESS

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February 17, 2012

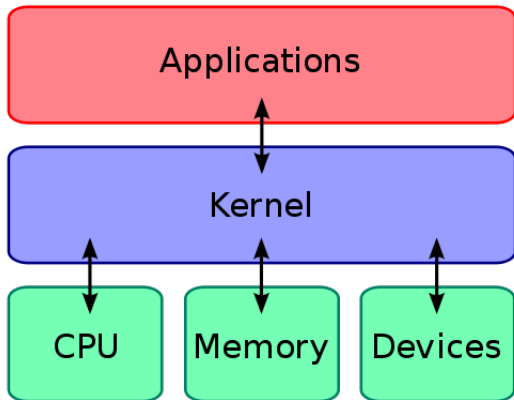
Training Outline

- 1. The Operating System Kernel**
- 2. Brief History of UNIX**
- 3. Brief History of Linux**
- 4. Brief History of Emacs and ESS**
- 5. UNIX/Linux Cheap/Free Resources**
- 6. Important UNIX/Linux Commands**
- 7. File Permissions**
- 8. Wildcards**
- 9. Keyboard Shortcuts**
- 10. Emacs and ESS**

If all else fails, read the instructions.

- Donald Knuth, renowned computer scientist

Operating System Diagram



A Brief History of UNIX®

- **1969: AT&T Bell Labs starts work on UNIX**
- **1970: open source UNIX provided for small fee**
- **1972-3: Bell Labs develops C, re-writes UNIX in C**
- **1973-8: DARPA invents TCP/IP network protocol**
- **1978: University of California releases
Berkeley Software Distribution (BSD) UNIX**
- **1981-3: ARPANET goes TCP/IP (Internet)**
- **1987: MIT/DEC release the X Window System (X11)**
- **1990: AT&T and BSD are merged into UNIX SVR4**
- **1992: SUN releases Solaris (SVR4) with X11**
- **1993: CDE is released; standard UNIX GUI**
- **1999-2000: SSL/SSH are released for Internet security**

A Brief History of GNU Linux

- **1984: Stallman creates GNU (GNU is Not Unix)
“complete, UNIX-compatible software system”
GNU General Public License (GPL)**
- **1991: Linux kernel by Linus Torvalds mimics UNIX**
- **1992: Linux kernel GPLed and paired with GNU tools**
- **1992-4: Free BSD released; AT&T lawsuit favors Linux
Debian Linux released with Debian Manifesto
Red Hat Linux released; services for sale**
- **1997-8: KDE/GNOME GUIs (GNOME to Solaris in 2000)**
- **1999: Intelligent package installers
GNU Compiler Collection (GCC): C/C++/FORTRAN**
- **2002: Red Hat Enterprise Linux (RHEL)**
- **2004: Laptop/Desktop-friendly Ubuntu Linux released
Linux shipped on 20-50% of new servers**

A Brief History of Emacs and ESS

- **1975: Emacs created by Richard Stallman at MIT**
- **1984: re-writes GNU Emacs (GPL) in C**
Apple Macintosh Human Interface Guidelines
- **1986: FORTRAN-mode; intelligent editing for FORTRAN**
- **1987: IBM Common User Access (CUA)**
- **1990: Sall adds some SAS support to GNU Emacs**
- **1991: Multi-lingual XEmacs (GPL) for X11 released**
- **1994: GNU Emacs (GPL) for X11 released**
Tom Cook releases SAS-mode (GPL)
- **1994-7: Anthony Rossini creates ESS (GPL)**
contains ESS[SAS], ESS[S], ESS[Stata], etc.
- **1999+: my ESS[SAS] improvements**

UNIX/Linux Cheap/Free Resources

- **UNIX in a Nutshell, O'Reilly: ebook \$14, paperback \$35**
- **Oracle Solaris** http://docs.oracle.com/cd/E23824_01/index.html
- **The Linux Documentation Project (TLDP)**
<http://www.tldp.org> especially
<http://www.tldp.org/guides.html>
<http://www.tldp.org/LDP/>
[GNU-Linux-Tools-Summary/html/index.html](http://www.tldp.org/LDP/intro-linux/html/index.html)
<http://www.tldp.org/LDP/intro-linux/html/index.html>
<http://www.tldp.org/LDP/>
[Bash-Beginners-Guide/html/index.html](http://www.tldp.org/LDP/abs/html/index.html)
Advanced Bash-scripting Guide
<http://www.tldp.org/LDP/abs/html/index.html>

Important UNIX/Linux Commands and Syntax

- `man COMMAND` : **system manuals; also** `info COMMAND`
- `echo $PATH` : **current PATH for executing commands**
- `which COMMANDs` : **search PATH for commands**
- `cd DIRECTORY` : **change directory**
- `ls FILEs` : **list files or directories**
- `ls -l FILEs` : **list files with details; also** `ls -l DIRs`
- `ls -ld DIRs` : **list directories with details**
- `mkdir DIR` : **create directories**
- `mv FILEs DIR` : **move; mv FILE1 FILE2** : **rename**
- `cp FILEs DIR` : **copy; cp FILE1 FILE2**
- `rm FILEs` : **remove file; rmdir DIR and** `rm -r DIR`

Important UNIX/Linux Commands and Syntax

```
kingkong:~:$ man chmod # info chmod
kingkong:~:$ mkdir bin
kingkong:~:$ ls -ld bin
drwxr-xr-x 2 rsparapa pcor 4096 Feb  9 13:43 bin
kingkong:~/:$ cd bin
kingkong:~/bin:$ echo 'echo $PATH' > path
kingkong:~/bin:$ ls -l path
-rw-r--r-- 1 rsparapa pcor 11 Feb  9 13:43 path
kingkong:~/bin:$ chmod +x path
kingkong:~/bin:$ ls -l path
-rwxr-xr-x 1 rsparapa pcor 11 Feb  9 13:43 path
kingkong:~/bin:$ path # if . or ~/bin in your PATH
kingkong:~/bin:$ ./path # otherwise
```

Important UNIX/Linux Commands and Syntax

- `more FILE` : **display a file; also** `less`
- `env` : **display environment variables**
- `echo $SHELL` : **current SHELL**
- `file FILEs` : **describe file contents**
- `groups` : **list groups of mine**
- `chown USER:GROUP FILEs` : **change owner and group**
- `chgrp GROUP FILEs` : **change group only**
- `chmod MODE FILEs` : **change permission modes**
- `MODE=UGO` **3 digits made of: 4=r, 2=w, 1=x; or 4 bytes**
- `MODE=DUGO` : **4=set user ID, 2=set group ID, 1=set sticky**
- `umask` : **file creation mode/mask setting**
- `umask MASK` : **resetting file creation mode/mask**

File Permissions and chmod

- **4 bytes DUGO : Directory/User/Group/Other**
- DUUUGGG000 : **directory** chmod u=rwx,g=rx,o=x DIR
- drwxr-x--x : **details**
- DUUUGGG000 : **file** chmod u=rw,g=r DIR
- -rw-r----- : **details**
- 421421421

File Permissions and umask

	421		421
	110	MODE	rw-
XOR	010	MASK	-w-
	100		r--
e.g.	umask 0002		-rw-r--r--

	421		421
	110	MODE	rw-
XOR	110	MASK	rw-
	000		---
e.g.	umask 0006		-rw-r-----

Important UNIX/Linux Commands and Syntax

```
kingkong:~/bin:$ echo 'new file contents' > newfile
kingkong:~/bin:$ ls -l newfile
-rw-r--r-- 1 rsparapa pcor 18 Feb  9 13:43 newfile
kingkong:~/bin:$ chmod 660 newfile
kingkong:~/bin:$ ls -l newfile
-rw-rw---- 1 rsparapa pcor 18 Feb  9 13:43 newfile
kingkong:~/bin:$ chown rsparapa:survey newfile
kingkong:~/bin:$ ls -l newfile
-rw-rw---- 1 rsparapa survey 18 Feb  9 13:43 newfil
```

Pattern Matching AKA Wildcards

- **File wildcards:** `*` match anything; `?` any single character; `[CHARACTERS]` match any listed character
- `ls *.txt *. [sS] [aA] [sS] *. [lL]??`
- `grep RE FILEs` : search files for regular expressions
- **RE wildcards:** same as above except
- `.` match anything;
- `*` repeat previous zero or more;
- `+` repeat previous one or more;
- `^` beginning of line; `$` end of line
- `[^CHARACTERS]` match any character NOT listed
- `grep ^ERROR *.log`

Standard Keyboard Shortcuts

GNOME Human Interface Guidelines (HIG)

<http://developer.gnome.org/hig-book/3.0/input-keyboard.html.en#standard-shortcuts>

IBM Common User Access (CUA)

Cut	Sh-Delete
Copy	C-Insert
Paste	Sh-Insert

Latin-1 Characters and Oracle/Sun Keyboards

<http://docs.oracle.com/cd/E19683-01/806-4743/6jdg6q2n7/index.html>

Emacs and ESS

```
kingkong:~:$ emacs & # & runs in the background
kingkong:~:$
rho:~:$ xemacs & # On Solaris, use XEmacs
```

GNU Emacs/XEmacs Tutorial: F1 t **or** C-h t

GNU Emacs initialization file: ~/.emacs

XEmacs initialization file: ~/.xemacs/init.el

Emacs and ESS on the web

<http://ess.r-project.org/Manual/ess.html#ESS-for-SAS>

<http://www.damtp.cam.ac.uk/user/eglen/ess11/index.html> **http:**

[//www.mcw.edu/pcor/education/sas/xemacs.htm](http://www.mcw.edu/pcor/education/sas/xemacs.htm)

ESS[SAS] Function Keys

Key	Approximate Display Manager Equivalent in CAPS
F1	help key, same as C-h
F2	refresh the buffer with the file contents
F3	SUBMIT
F4	PROGRAM
F5	LOG
F6	OUTPUT
F7	text file, if any
F8	go to the *shell* buffer
F9	VIEWTABLE
F12	open a GSASFILE graphics file near point for viewing
C-F1	create a portrait RTF from current buffer
C-F2	create a landscape RTF from current buffer