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Systems and Internet
Infrastructure Security Laboratory

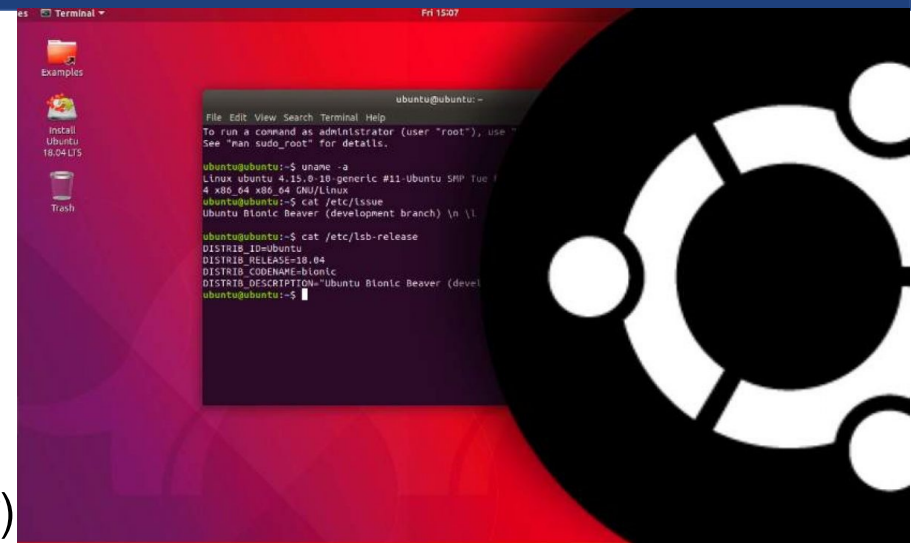
CMPSC 311 - Introduction to Systems Programming

UNIX Essentials

Professors:

Suman Saha

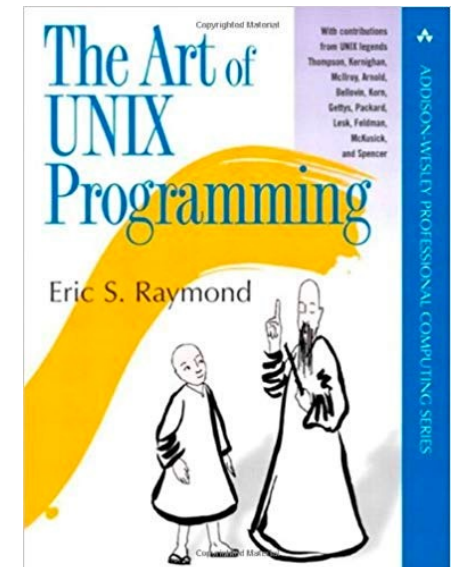
(Slides are mostly by *Professor Patrick McDaniel* and *Professor Abutalib Aghayev*)



The Unix Philosophy



- Write programs that do one thing and do it well.
- Write programs to work together.
- Write programs to handle text streams, because that is a universal interface.
 - Doug McIlroy, Unix patriarch
- More general programming principles:
 - KISS – “Keep it simple, stupid”
 - Modularity – thinking in terms of components
 - Composability – thinking in terms of interacting components
 - Transparency – making inspection and debugging easier
 - etc...

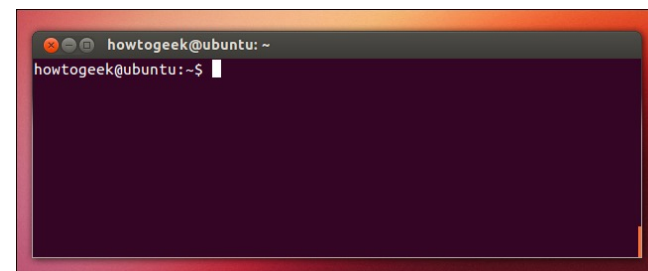


Command line interface



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- Command line? Why?
 - Efficient and powerful
 - Scriptable
 - Simple and reliable
 - Always works... even if everything else is b0rked!
- What is it?
 - Shell program (“bash” on Linux)
 - Interprets built-in commands
 - Runs other programs
 - Runs shell scripts



Standard filesystem layout



- **Grouped by type**
- **/** root directory of the entire filesystem
- **/usr** installed software
 - `/usr/bin, /usr/lib, ...`
- **/etc** configuration
- **/home** users' own files
- **/dev** devices
- **/tmp** temporary files



Root (administrator)

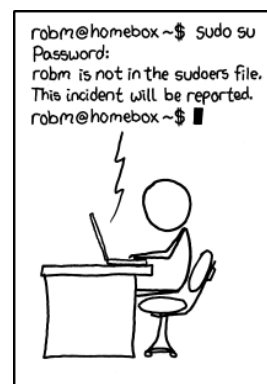
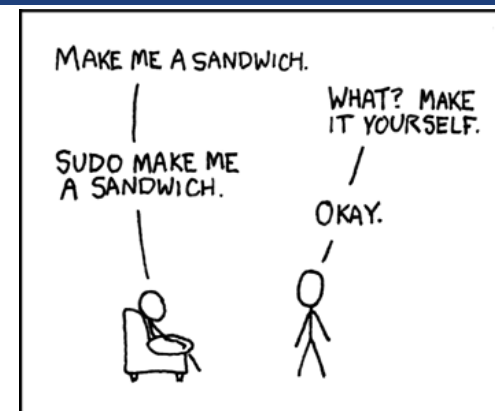


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- Files in Unix have owners
 - Users can (usually) only touch their files
- Root (Super User) can do anything
- "Becoming root"
 - Administrative privileges: *su*
 - Temporary privileges (per command):
sudo (su "do")

We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:

- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.



<https://xkcd.com/149/> <https://xkcd.com/838>