
CSE 390a

Lecture 4

Persistent shell settings; users/groups; permissions

slides created by Marty Stepp, modified by Josh Goodwin

<http://www.cs.washington.edu/390a/>

Lecture summary

- Persistent settings for your bash shell
- User accounts and groups
- File permissions
- The Super User

.bash_profile and .bashrc

- Every time you log in to bash, the commands in `~/.bash_profile` are run
 - a `.` in front of a filename indicates a normally hidden file (`ls -a` to see)
 - you can put any common startup commands you want into this file
 - useful for setting up aliases and other settings for remote login
- Every time you launch a non-login bash terminal, the commands in `~/.bashrc` are run
 - Useful for setting up persistent commands for local shell usage, or when launching multiple shells
 - Often, `.bash_profile` is configured to also run `.bashrc`, but not always

.bash_profile and .bashrc

- *Exercise* : Make it so that our `attu` alias from earlier becomes persistent, so that it will work every time we run a shell.
- *Exercise* : Make it so that whenever you try to delete or overwrite a file during a move/copy, you will be prompted for confirmation first.

.plan

- Another fun settings file
- Stored in your home directory
- Contains information you'd like others to be able to see
 - is displayed when the finger protocol is run
- Exercise: create a quick .plan file, and make sure it works with finger

Users

Unix/Linux is a multi-user operating system.

- Every program/process is run by a user.
- Every file is owned by a user.
- Every user has a unique integer ID number (UID).
- Different users have different access permissions, allowing user to:
 - read or write a given file
 - browse the contents of a directory
 - execute a particular program
 - install new software on the system
 - change global system settings
 - ...

Groups

command	description
groups	list the groups to which a user belongs
chgrp	change the group associated with a file

- **group:** A collection of users, used as a target of permissions.
 - a group can be given access to a file or resource
 - a user can belong to many groups
 - see who's in a group using `grep <groupname> /etc/group`
- Every file has an associated group.
 - the owner of a file can grant permissions to the group
- Every group has a unique integer ID number (GID).
- Exercise: create a file, see its default group, and change it

File permissions

command	description
chmod	change permissions for a file
umask	set default permissions for new files

- *types* : read (r), write (w), execute (x)
- *people* : owner (u), group (g), others (o)
- on Windows, .exe files are executable programs;
on Linux, any file with x permission can be executed
- permissions are shown when you type `ls -l`

is it a directory?

owner
|
group
|
others
|
↓ ↓ ↓ ↓
drwxrwxrwx

Changing permissions

- letter codes: `chmod who(+-)what filename`

`chmod u+rw myfile.txt` (allow owner to read/write)

`chmod +x banner` (allow everyone to execute)

`chmod ug+rw,o-rwx grades.xls` (owner/group can read and

note: `-R` for recursive write; others nothing)

- octal (base-8) codes: `chmod NNN filename`

- three numbers between 0-7, for owner (u), group (g), and others (o)

- each gets +4 to allow read, +2 for write, and +1 for execute

`chmod 600 myfile.txt` (owner can read/write (rw))

`chmod 664 grades.dat` (owner rw; group rw; other r)

`chmod 751 banner` (owner rwx; group rx; other x)

Exercises

- Change a file to grant full access (rwx) to everyone
 - Now change it to deny all access (rwx) from everyone
 - !!! is it dead?
 - I own this file. Can I change the user?
- Project space on the cubist department server
 - How are the group permissions set up initially?
 - What are the default permissions for files I upload?
 - What are the implications of that?
 - How can I set up permissions so all my group members have access?

Permissions don't travel

- Note in the previous examples that permissions are separate from the file
 - If I disable read access to a file, I can still look at its permissions
 - If I upload a file to a directory, its permissions will be the same as if I created a new file locally
- Takeaway: permissions, users, and groups reside on the particular machine you're working on. If you email a file or throw it on a thumbdrive, no permissions information is attached.
 - Why? Is this a gaping security hole?

Lets combine things

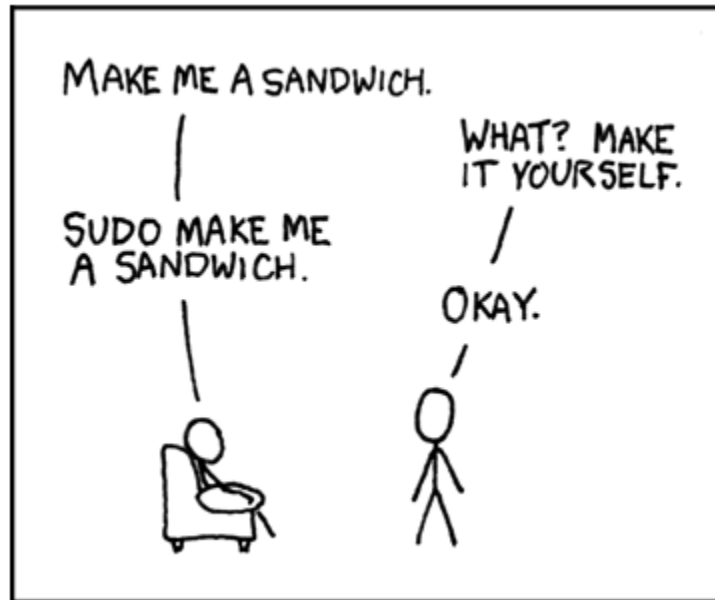
- Say I have a directory structure, with lots of .txt files scattered
 - I want to remove all world permissions on all of the text files
 - First attempt:
 - `chmod -R o-rwx *.txt`
 - What happened?
 - Try and fix this using `find` and `xargs`!
 - `find -name "*.txt"`
 - `find -name "*.txt" | xargs chmod o-rwx`

Super-user (root)

command	description
sudo	run a single command with root privileges (prompts for password)
su	start a shell with root privileges (so multiple commands can be run)

- **super-user:** An account used for system administration.
 - has full privileges on the system
 - usually represented as a user named root
- Most users have more limited permissions than root
 - protects system from viruses, rogue users, etc.
 - if on your own box, why ever run as a non-root user?
- Example: Install the `sun-java6-jdk` package on Ubuntu.
`sudo apt-get install sun-java6-jdk`

Playing around with power...



Courtesy XKCD.com

Playing around with power...

- Create a file, remove all permissions
 - Now, login as root and change the owner and group to root
 - Bwahaha, is it a brick in a user's directory?
- Different distributions have different approaches
 - Compare Fedora to Ubuntu in regards to sudo and su...
- Power can have dangerous consequences
 - `rm *` might be just what you want to get rid of everything in a local directory
 - but what if you happened to be in `/bin...` and you were running as root...

Wrap-up discussion

- What do you think of the permissions model in *nix?
 - How does it compare to your experience of other OS's?
 - What are it's strengths?
 - Are there any limitations? Can you think of a scenario of access rights that this approach doesn't easily facilitate?
- Additional info: ACL vs. Capabilities
 - Access Control Lists
 - Like what we just looked at – each file has a list of who can do what
 - Capabilities
 - Different approach using capabilities, or “keys”
 - Principle of least privilege, keys are communicable
 - Not a focus point, but more info online if you're interested