

Unix Security Overview

1 User and Group

- Users

- root: super user (uid = 0)
- daemon: handle networks.
- nobody: owns no files, used as a default user for unprivileged operations.
 - * Web browser can run with this mode.
- User needs to log in with a password. The encrypted password is stored in `/etc/shadow`.
- User information is stored in `/etc/passwd`, the place that was used to store passwords (not anymore). The following is an example of an entry in this file.

```
john:x:30000:40000:John Doe:/home/john:/usr/local/bin/tcsh
```

- Groups

- Sometimes, it is more convenient if we can assign permissions to a group of users, i.e. we would like to assign permission based on groups.
- A user has a primary group (listed in `/etc/passwd`), and this is the one associated to the files the user created.
- Any user can be a member of multiple groups.
- Group member information is stored in `/etc/group`

```
% groups uid (display the groups that uid belongs to)
```

- For systems that use NIS (Network Information Service), originally called Yellow Page (YP), we can get the group information using the command `yppcat`.

```
% yppcat group (can display all the groups and their members)
```

2 File Permissions

- File Permissions

- The meaning of the permission bits in Unix.
 - * Owner (u), Group (g), and Others (o).
 - * Readable (r), Writable (w), and Executable (x).
 - * Example: `-rwxrwxrwx (777)`

- Permissions on Directories:

- r: the directory can be listed.
- w: can create/delete a file or a directory within the directory.

- x: the directory can be entered.
- Change permission: `chmod`
- Full Access Control List: using `getfacl` and `setfacl`.
- Default File Permission
 - What is the default file permission assigned to the newly created files?
 - This default permission is stored in the `umask` environment variable.
 - `umask`: permissions you do not want
 - Default value in some systems: `022`
 - * This set the permission of new files (non-executable) to `rw-r-r-`.
 - Safest value: `077`
 - * This sets the permission of new files (non-executable) to `rw-----`.
 - Check your own setting by executing the following

```
% umask
```
 - Change the `umask` value. You can execute the following command or put it in your `.profile` file.

```
% umask 077
```

3 Security-Related Commands

- Switch user
 - Change your user ID to `xyz`, `su` means “substitute user”)

```
% /bin/su xyz
```
 - Change to root. This is a common way to invoke superuser access). Once you are in the superuser account, the prompt becomes the pound sign (`#`).

```
% /bin/su -
```
 - Running a command using superuser privilege. Sometimes, we just want to run a command using the superuser privilege. Instead of `su` to root, and run the command, we can use the `sudo` command.

```
(view the shadow file as a superuser)
% sudo more /etc/shadow
```

To be able to use `sudo` to run a command as the superuser, permissions must be granted (by the root) to the user. This is done through the `/etc/sudoers` file.

- Change the owner of files

- The chown command.

```
% chown wedu file
```

- Q: Can we allow a user to change the owner of files to another user?

- * No. Actually, only root can use chown. Why?

- * We will understand why after we have learned Set-UID

- Change the group of files

- The chgrp command.

```
% chgrp seed /home/seed/785
```

- Q: Can we allow a user to change the group of files to another group?

- * Yes/No. If you want to change to group XYZ, you must be a member of XYZ

- * The reason is similar to the chown command (Set-GID).

- Miscellaneous

```
% whoami (to print out your current user name)
```

```
% /usr/bin/id (display both uid and gid)
```

```
% man chmod (find the manual for the chmod command)
```