Install Application in Debian

Before We Start

- Permission issue
  - root: the superuser
  - In Unix-like system, root is the conventional name of the user who has all rights or permissions (to all files and programs) in all modes (single-user or multi-user).
- Don't execute any command as root directly
  - It's DANGEROUS.
- However sometimes you still need to be root to do something
  - Install software
  - Manage system settings
  - Create/modify/delete user accounts
  - Other system-level configuration

Before We Start

```
$ whoami
tsaimh
$ su -
Password:
$ whoami
root
```

- Become root
  - Console login with root.
  - By default, you cannot login as root via SSH.
- Change account
  - To see which account you are using, use "whoami".
  - Regular accounts can login via SSH do not need to login with console.
  - Use command "su -", and then type root's password.
    - In FreeBSD, only user in "wheel" group can use "su - " to change to root.
    - In Debian, by default, everyone can "su - " to root. If you want to limit it to wheel group, you can uncomment the following line in /etc/pam.d/su
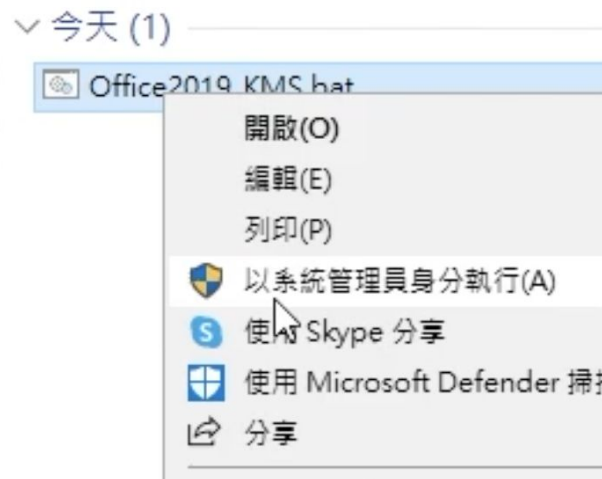
      # auth   required   pam_wheel.so

Before We Start

- As mentioned before, don't run as root directly.
- Can we execute with root's credential only for some specific commands?
  - Like 'Run as administrator' in Windows.
  - Is there similar commands in Debian/FreeBSD?
- By using the "sudo" command, you can run commands with other user's permission

Install Sudo

- How to install sudo?
  - In FreeBSD, "sudo" is not a command in the base. We need to install it manually.
    - Become root by running `su -` or login as root directly on console. Then run /
      `pkg install sudo`
    - This will install 'sudo' from Internet
    - Type 'Y' (means yes) when it asks for confirmation
  - In Debian, "sudo" is installed by default.

Enable Sudo

- If you are not familiar with the default editor 'vi', type the following command to change to a notepad-like editor for this time (skip this step otherwise)
  - In FreeBSD, run `setenv EDITOR ee`
  - In Debian, nano is the default editor. You do not need to do anything.
- Allowing your user to execute "sudo"
  - Switch to root first
  - Type "visudo" to edit the sudoers file (i.e., /usr/local/etc/sudoers or /etc/sudoers)
    - Specify who can use "sudo"
  - Save the file and exit, back to normal user
    - Use "logout" command or press Ctrl+D

```
root ALL=(ALL) ALL
tsaimh ALL=(ALL) ALL
```

Use Sudo

- Now, you can prepend "sudo" before commands to run them as root
  - But please think carefully before you hit enter
- Execute commands with "sudo"
  - sudo whoami
  - Install software without becoming root directly
    - sudo pkg install vim
    - sudo apt install vim
  - You need to re-type your password
    - Don't need to re-type within 5 minutes in FreeBSD and 15 minutes in Debian

```
% sudo -l
User tsaimh may run the
following commands on
debian4:
(ALL : ALL) ALL
% whoami
tsaimh
% sudo whoami
Password:
root
%
```

Install Software - Overview

- Package (Pre-built binary programs)
  - Like installers (.msi) in Windows
  - rpm on RedHat Linux, deb on Debian Linux
- Package Manager
  - Install/remove/upgrade packages
  - Other Unix-like systems
    - rpm, yum, dpkg, apt, dnf, pacman, etc.

Install Software

- Packages can also installed from source (compiled by yourself) and from git (follow the instructions provided on repo page).
- Running commands like `curl <url> | sh` is highly unrecommended because
  - The script may contain malicious code.
  - The network transmission may break content of the script.
- Instead, download the script, review it, and execute it.

Package System

- Advanced Package Tool (or APT) is the main command-line package manager for Debian and its derivatives.
- It can install deb format packages from Debian package repository.

Package Installation

- Before installing and upgrading packages, you should run `apt update` first to update the information of package repositories.
  - If you forget to run it, you may find that apt always tells you package is not found.
- You can use `apt search <keyword>` to find packages.
  - Or via the website https://packages.debian.org/index.

Package Installation

- Run `apt install <package name>` to install the package.
  - For example, `apt install tmux`.
- Some software does not upload their deb files to repository but place them in GitHub releases.
  - You can download the deb files and run `apt install ./<deb filename>`.
  - Note that **you must specify the path**, even though it is in the current directory.

Package Installation

- In addition to official repository, some software has their self-hosted ones.
  - For example, Docker.
- You can add them in `/etc/apt/sources.list.d`.
- For example, Docker installation script.

```
case "$lsb_dist" in
        ubuntu|debian|raspbian)
            pre_reqs="ca-certificates curl"
            apt_repo="deb [arch=$(dpkg --print-architecture)
signed-by=/etc/apt/keyrings/docker.asc] $DOWNLOAD_URL/linux/$lsb_dist $dist_version $CHANNEL"
            (
                ...
                $sh_c "echo \"$apt_repo\" > /etc/apt/sources.list.d/docker.list"
                $sh_c 'apt-get -qq update >/dev/null'
            )
```

Package Upgrade

- Run `apt upgrade <package name>` for upgrading specific package.
  - Or use `apt upgrade` to upgrade all packages.
- You also use apt for upgrading system, and the full instruction can be found in official website.
  - TL;DR: backup everything and run `apt full-upgrade` and `apt dist-upgrade`.

Package Removel

- Run `apt remove <package name>` to remove specific package.
- Run `apt purge <package name>` to remove specific package and its config files.
- If you want to reinstall the package, run `apt reinstall <package name>` instead.
- After removal, you can run `apt autoremove` to remove unused packages.
  - They are the dependencies of the removed packages, and they are not used by other installed packages.
  - Sometimes, this can be dangerous.

Package Information

- Run `apt show <package name>` to view the information of specific package.
- For exmaple, `apt show tmux`.

```
$ apt show tmux
Package: tmux
Version: 3.5a-3
Priority: optional
Section: admin
Maintainer: Sebastien Delafond <seb@debian.org>
Installed-Size: 1,238 kB
```