Understanding the kernel build process

This documentation will focus on the processes taking place in the background during a kernel build.

This document will go over the main steps of building a kernel (*NOTE: It is assumed that the reader is well aware of the usage of basic linux commands like* `cd`, `uname -r`, `nproc` *etc. Also the explanation of commands like* `du` *and* `df` *shall also not be provided in this document. But the links for the same can be found in the resources section.*)

After extracting the linux kernel archive, the steps begin with running the following command inside the folder:

```
$ sudo make
```

The `make` command compiles the kernel and links the kernel image to a file named `vmlinuz` (**V**irtual **M**emory **Linu**x gZip). The instructions on how to do so are in the `Makefile`.

What is vmlinuz ?

`vmlinuz` is the compressed executable file for the kernel which is bootable.

The next step is

```
$ sudo make modules_install
```

This command will compile the modules, make the binaries and will load the modules to the `modules` directory of the kernel.

NOTE: Some tutorials suggest running `make modules` *before running* `make modules_install`. *The* `make modules` *command will first compile the modules and save the binaries in the directory. Then the* `make modules_install` *command will load the binaries to the kernel. You can run the latter command if you are sure that the modules will compile correctly.*

The next in the process is the given command:

```
$ sudo make install
```

This command will install the built kernel to the `\vmlinuz`.

After the kernel has been built, we want to run it the next time we boot. This is done using the following sets of commands:

```
$ sudo update-initramfs -c -k 4.16.13
$ sudo update-grub
```

The `initramfs` is a cpio archive which is extracted and loaded onto the RAM and uses it as the initial file system during the boot process.

The `-c` flag specifies that a new initramfs needs to be created, the kernel version for which is specified using the `-k` flag.

The `update-grub` command updates the `menu.list` file, which contains the contents of the GRUB menu. All the files whose names start with `vmlinuz-` are added to the `menu.lst` and are considered as kernel and are displayed on the next boot.

The last step is to `reboot` the system and start using the new kernel.

Cheers!!

Resources

1. vmlinuz
2. `make modules` vs `make modules_install`
3. initramfs
4. GRUB file
5. Grub updation
6. du command
7. df command

Credits

1. Fraida Fund, NYU