LDDD

Read chapter 2, 4

**Driver**: a piece of software which controls and manages a particular hardware device.

* Drivers may be in either the kernel space (privileged) or in the user space.
* Kernel and User space is defined by memory access privileges

**Kernel Space:** Set of addresses where the kernel is hosted and where it runs.

**User Space:** The set of addresses where normal programs are restricted to run.

* System calls are the only method of running a user app in Kernel space.

**Module**: Dynamically extends the kernel functionalities without the need to even restart the computer.

* In order to support modules, the kernel must have been built with the following option enabled:
  + *CONFIG\_MODULES = y*

**Module Dependencies**: Modules can provide functions or variables, exporting them using the *EXPORT\_SYMBOL* macro, which makes them available for other modules.

* Functions or variables exported with this macro are called **symbols**.
* Creates a file *modules.dep* along with a binary version called *modules.dep.bin*.

***depmod***

* Run during the kernel build process to generate module dependency files. Reads each module in */lib/modules/<kernel\_release>/*

**modprobe and insmod**

* *insmod* is typically used during development.
  + Is provided the path of the module to load.
* *modprobe* is typically used by system admins or in a production system.
  + Parses the modules.dep file
  + *depmod* must be aware of the module installation in order to use *modprobe.*

**Loading modules at boot time**

* To do so, just create a file */etc/modules-load.d/<filename>.conf* and add the module’s name that should be loaded.
  + One module name per line.

Example:

*#this line is a comment*

*uio*

*lwlwifi*

**\_\_init and \_\_exit**

* Kernel macros.
* Built-in modules have their init function only called at boot-time.

**Executable and Linkable Format (ELF)**

* Run *objdump -h module.ko* in order to print out different sections that constitute the given module.