Operating Systems Homework 1 Report

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1. **What is a kernel? What are the differences between *mainline*, *stable*, and *longterm*? What is a kernel panic**

The **kernel** of the operating system refers to the program that is always running on the computer. The kernel might include software for CPU scheduling, file system management, etc… which are integral to the normal operation of the system. There are different ways to release an operating system kernel.

The **mainline** kernel is the kernel that is currently being worked on and developed. Since there is constant development work occurring on the mainline kernel, there are constant releases of this kernel.

Once the mainline kernel has been released and iterated on, it moves to be a **stable** kernel. The stable kernel receives less updates than the mainline kernel, those usually being more significant bug fixes.

The final step is becoming a **longterm** kernel. This kernel will be mostly be used for bugfixes for older versions of the operating system.

A big purpose of these releases and constant updates is to minimize the occurrence of **kernel panics**. These are errors which might have serious consequences on the operation of the kernel. The causes for a kernel panic might involve unrecoverable errors in memory, drivers, or other kernel component.

2. **What are the differences between *building*, *debugging*, and *profiling*?**

Building the kernel refers to compiling the source operating system source code. In the second step of the homework, we download the kernel using the `wget` command. Then we further download additional required dependencies and compile the kernel source code using the `make` command.