

Lab Six

Marinel Tinnirello

Miranda.Tinnirello@Marist.edu

October 20, 2020

1 PROBLEM ONE

Memory protection is a key component to an operating system, limiting a program's access to make sure they aren't taking space not specifically allocated to it. This can be done via base and limit "registers" and mode switching.

1.1 WHAT?

The base "register" is the smallest value in the physical address space. The limit "register" is the range of possible values in the virtual address space, in our operating system our limit is 256 bytes per segment. These addresses are translated from physical to virtual at the memory accessor and are kept in check by the program counter in the CPU to make sure no programs crash into each other.

Programs are further protected by the separate modes: kernel and user. The hardware needs the CPU to be in kernel mode in order to modify the address table. Likewise, an application can't reach its assigned address unless the CPU is in user mode.

1.2 WHY?

Without keeping tabs on our base and limit "registers", programs would be crashing into each other constantly. Were we not to keep track of how our programs are allocated, whether or not those partitions are of a fixed size or not, the programs would be touching the wrong address spaces, which could lead to issues as simple as accessing the wrong data or as malicious as malware getting into sensitive areas of the system. This is also why the dual-mode system exists, to help mitigate access rights further, should there be any issues with program allocation.