

# Kernel VS User Space

→ Modern operating system, memory is divided into two distinct regions.

→ Kernel Space:

- protected area of memory where OS core, kernel, resides and executes
- Also includes kernel modules, device drivers and other critical OS services
- Kernel runs in most privileged mode (Ring 0)
- has direct access to all hardware

→ User Space

- all user facing applications
- less privileged (Ring 3) and no direct access to hardware or kernel memory

- must use system calls to request any service that requires kernel privileges
- To call any kernel service, following happens
  - User space program prepares arguments for system call
  - it executes a special instruction to trigger a software interrupt or a special CPU mode switch
  - CPU privilege level changes
  - control is transferred to a specific entry point in the kernel
  - kernel executes the requested service on behalf of user space program
  - Once the operation is complete, the results are returned to user space program and the CPU privilege level switches back

• — *ewg*