University of Illinois at Urbana-Champaign
Dept. of Electrical and Computer Engineering

ECE 220: Computer Systems & Programming

Privilege, Traps, Interrupts,
and Libraries

Hardware Devices Usually Not Robust to Errors

Hardware devices often assume
proper use of their protocols.

If software makes errors,
◦ the hardware may stop working…
◦ …or worse.

"Here's your laptop.
Something really funny happened.
I wrote BRz instead of BRnz …
…and the hard drive melted."

OS Protects Hardware and Other Users/Programs

To reduce problems, one can **restrict software access to I/O registers**.

Other forms of protection are also useful:
◦ between users, and
◦ between unrelated programs.

Enforcing such **protection is** usually the **domain of the operating system** (OS).

Many ISAs Provide Privilege to Support OS Protection

Hardware supports OS with privilege.

Code executes either
◦ privileged (can do anything), or
◦ not privileged (must rely on the OS).

LC-3 uses a bit in the **Processor Status Register** (PSR, not mentioned previously):
◦ 0 means privileged
◦ 1 means unprivileged

(That's all we'll say about LC-3 privilege.)