

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

## ECE 220: Computer Systems & Programming

Scope, Storage Class, Memory Map,  
and Register Conventions

## Data Unlikely to Fit in Registers

In assembly code,

- programmer identifies data needed and
- decides where to put each datum.

Even **programs** of moderate size are **likely to**

- **have more data**
- **than registers** in the ISA.

In histogram example, we had

- data used to initialize histogram and
- data used for counting.
- Could add data for printing, too.

## Most Data Not Needed Everywhere in a Program

A question for you:

**Do all data need to be available  
in all parts of the program?**

**No!**

While counting characters for the histogram,  
we did not need

- initialization data, nor
- printing data (was not even defined).

## A Datum's Scope Determines Where It Can be Used

In assembly code,

- the **scope** of a datum is
- the **part of the program**
- **in which the datum is accessible.**

Usually (in assembly code),

- data are scoped within a subroutine
- or within one "part" of the program  
(initialization, counting, printing).

Outside of a datum's scope

- datum does not logically exist
- (bits may still be in location chosen).