

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

## ECE 220: Computer Systems & Programming

### Dynamic Resizing

## Programmers Rarely Know How to Size an Array

Allocation of arrays

- at compile time (**static allocation**)
- forces programmer to choose array size.

**Often, there's no good way to choose.**

For example,

- how many players do we need
- for *First International Blocky Server*?

10? 10,000? 10,000,000?

## Dynamic Resizing Grows Array to Fit Demand

One solution to this dilemma is called **dynamic resizing**:

- **Start with 10** players.
- If we **need > 10, change to 20**.
- If we **need > 20, change to 40**.
- And so forth.

**Each time we grow** the array

- existing **players must be copied**
- to the new array.

## How Much Copying is Needed for Dynamic Resizing?

Before we see how it works,

- it's worth asking:
- **how expensive is the copying?**

We can bound it:

- if we have **N players in the array**,
- the **last copy copied at most N** players,\*
- and the **previous copy copied at most N/2**,
- and **the one before that, at most N/4**.

\*Technically  $(N - 1)$ , but we're finding an upper bound anyway.