

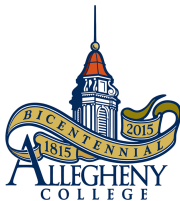
# *CS200 - Computer Organization*

## **Arrays & Pointers**

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# For starters!

- **Arrays:** Static Vs Dynamic
- Pointer Arithmetic
- Different ways for Pointer implementation

# Review on Arrays

- Arrays are data structures consisting of related data items of the same type.
- A struct (structure) in C - a data structure consisting of related data items of possibly different types.
- Arrays and structures are usually "static" entities in that they remain the same size throughout program execution. We may chose to implement Dynamic arrays with the use of **malloc** keyword.

# Extreme Programming:

Initializing array with even numbers.

# Try on your own:

Initializing array with odd numbers.

# Extreme Programming:

Computing the sum of elements in an array.

# Extreme Programming:

- Our next example uses arrays to summarize the results of data collected in a survey.
- Consider the problem statement.

Forty students were asked to rate the quality of the food in the student cafeteria on a scale of 1 to 10 (1 means awful and 10 means excellent). Place the 40 responses in an integer array and summarize the results of the poll.

- **This is a typical array application.**

# Important Properties of Arrays in C

- C has no array bounds checking to prevent the program from referring to an element that does not exist.
- Thus, an executing program can "walk off" either end of an array without warning-a security problem.
- You should ensure that all array references remain within the bounds of the array.



# Take home exercise:

Do exercise 1-13 and 1-14 on KR page 24.

# Pointers:

- Pointers enable programs to simulate pass-by-reference, to pass functions between functions, and to create and manipulate dynamic data structures, i.e., data structures that can grow and shrink at execution time, such as linked lists, queues, stacks and trees.

# Pointers:

- Pointers are variables whose values are memory addresses.
- Normally, a variable directly contains a specific value.
- A pointer, on the other hand, contains an address of a variable that contains a specific value.

# Pointers:

- To recap, a variable name directly references a value, and a pointer indirectly references a value.
- Referencing a value through a pointer is called **Indirection**.

# Extreme Programming:

- Revise the rating example code using **Pointer arithmetic**
- Shuffle three numbers using **Pass by value** and **Pass by reference**.

Section 1.6 in **KR**

# Questions

- Feel free to ask your questions.
- I welcome you to stop by after class time to clarify any confusion related to class topics.
- Also please stop by during my office hours so we can spend some time together.