# Dynamic Arrays

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# Opening Discussion

- What did we talk about last class?
- Programming Competition and ExtremeBlue internship.
- Questions on assignment #5?
- Quote from a random Usenet newsgroup

  *C isn't that hard: void (\*(\*f[])())() defines f as an array of unspecified size, of pointers to functions that return pointers to functions that return void.*
  *-- blm*

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# Pointer Arithmetic

- You can do arithmetic on pointers just as you can on normal ints, but fewer operations make sense.
  - Incrementing a pointer moves forward in memory by the size of the type of what the pointer points to. Adding more moves more.
  - Decrementing moves backwards the same way. Each unit is a full "record".
- To get the size of a type you use sizeof().

## Arrays as Blocks of Memory

❚ Arrays are just blocks of memory in the computer. An array with n elements has to be able to hold n chunks of memory with each the size of what the type requires or n*sizeof(type).

❚ When you declare an array normally you get a chunk of memory that size on the stack. If you use new to get such an array it is in the heap.

## Arrays as Pointer

❚ We have actually been using pointers for a while now because arrays are implemented as pointers. An array variable is just a pointer to the beginning of an appropriately sized chunk of memory.

```
int a[100];
// These are the same.
a[j]
*(a+j)
```

## Passing Pointers

❚ You can pass pointer arguments to functions. The syntax is just like declaring a pointer variable. Pointers can point to locations with one record or an array with many.

❚ Pointers to pointers are like two dimensional arrays.

```
void takePointer(int *a);
void takeArray(int *a,int len);
void take2DArray(int **a,int rows,int cols);
```

## Code with Dynamic Arrays

▌ Now let's take a minute to look at some code that involves dynamic arrays.  We looked at the syntax for allocating these in the last class.  Now that you know a little bit more about what a dynamic array is, we can look at code that uses them.

## Minute Essay

▌ Write code to get a dynamic array with size n and pass it to a function called fill.

▌ We have a quiz next class and assignment #5 is due the class after that (next Monday).  Make sure you have at least looked at that some.  There is only one function that should present a logic challenge to you, but you will need to ask about that next class at the latest.