ENSF 338 Lab 4

Group 35

Exercise 2

1. Explain the difference between an array size and capacity [0.2 pts]

The capacity is the total number of cells. The size is the number of cells, “the elements”.

2. What happens when an array needs to grow beyond its current capacity? Explain and produce a diagram showing the memory layout before and after expansion.

2.1. First, consider the case where there is space in memory after the end of the array [0.3 pts]

Assuming that we only want to insert the element in the front of the array, we will first start with a pointer on the right side of the array, then shift each element 1 element to the right. This will make the very first element of the array free to be occupied by the new array.

2.2. Then, consider the case where the memory after the end of the array is occupied by another variable. What happens in that case? [0.3 pts]

In this case, we would need to create an array of the old array + 1 so that it is able to accommodate the new element. First, we would give the first index to the new array, then one-by-one, copy the old array elements into the newly created one.

3. Discuss one or more techniques real-world array implementations use to amortize the cost of array expansion [0.2 pts]

When the array needs to be expanded because it's reached its capacity, instead of just adding one element at a time, the capacity of the array is doubled. This means that if the current capacity is 10 and the array needs to be expanded, the new capacity will be 20.