ECE 2400 Computer Systems Programming

Topic 6: C Dynamic Allocation

http://www.csl.cornell.edu/courses/ece2400
School of Electrical and Computer Engineering
Cornell University

revision: 2026-02-18-09-57

Please do not ask for solutions. Students should compare their solutions to solutions from their fellow students, discuss their solutions with the instructors during lab/office hours, and/or post their solutions on Ed for discussion.

List of Problems

Problem 1. Short Answer

Carefully plan your solution before starting to write your response. Please be brief and to the point; if at all possible, limit your answers to the space provided.

Part 1.A Array Duplication

The following `arraydup` function takes an array of integers and the size of that array as parameters and returns a copy of the input array. The new array is allocated on the heap, so the caller is responsible for eventually deallocating the copy. **Draw the state diagram that corresponds to the execution of this C program.** You must clearly label all variables. You must clearly specify all pointers using arrows. Do not erase any arrows; leave the arrows in place even if the pointer becomes invalid.

```
01 #include <stdlib.h>
02
03 // Function for duplicating an array
04
05 int* arraydup( int* x, int n )
06 {
07   int* y = malloc( n * sizeof(int) );
08
09   for ( int i = 0; i < n; i++ ) {
10     y[i] = x[i];
11   }
12
13   return y;
14 }
15
16 // Main function
17
18 int main( void )
19 {
20   int a[4] = { 10, 11, 12, 13 };
21   int* b = arraydup( a, 4 );
22   free(b);
23   return 0;
24 }
```