Computer Programming

Dr. Deepak B Phatak
Dr. Supratik Chakraborty
Department of Computer Science and Engineering
IIT Bombay

Session: Quiz and Practice Questions on Pointers

Recap Quiz

IIT Bombay

Q1. Consider the following code fragment

```
int a, *b;
b = new int;  a = *b;
```

The above code, when executed, can lead to:

A. **Segmentation violation**
B. **Garbage value being copied to a**
C. **No run-time error**
D. **None of these**

Recap Quiz

IIT Bombay

Q2. Invokation of "delete" in a program frees up memory in which of the following:

A. Data segment (or heap)
B. Stack segment
C. Code segment
D. None of these

Recap Quiz

IIT Bombay

Q3. Consider the following code fragment:

```
int * A = new int[10];
```

Which of the following are true:

A. *(A + 1) is the same as A[1]

B. *(A + 1) leads to a segmentation violation

C. *(A + 1) is the same as *A[1]

D. None of these

Recap Quiz

IIT Bombay

Q4. In which of the following situations is memory dynamically allocated in a program de-allocated?

A. When the program terminates and exits
B. By executing “delete” in the program
C. By executing “deallocate” in the program
D. Whenever the program runs out of memory executing “new”

Practice Question 1A

Suppose we have two arrays A and B as follows:

```
int A[100];
int *B[100];
```

Assume that

All elements of A are integers (possibly duplicated) in {0, … 99}.

All elements of B are addresses (possibly duplicated) of elements of A or NULL (0x0)

Illustration of Chain of Pointers

Practice Question 1A

IIT Bombay

We want to represent a chain (or linked list) of pointers using arrays A and B as follows:

The first element of the linked list is B[0].

The second element of the linked list is B[i], where i is the value of *first_element

The third element of the linked list is B[j], where j is the value of *second_element

Practice Question 1A

Write a function int findLength(int *A, int **B) that finds the length of the linked list. You may assume that the list has ended when we encounter the NULL address (0x0).

Write a function void insert(int j, int *A, int **B) that inserts the address of A[j] at the end of the linked list.


IIT Bombay

Practice Question 1B

IIT Bombay

Let us look at the elements in A. Array A serves as a memory storage for the indices of consecutive pointers in the chain.

- Is there any relation between A[i] and A[i+1]?
- Discuss why do we need to store these indices in an array? Do we need to at all?

Practice Question 1B

Let us suppose that the chain is of size 3. For such a small sized chain, why do we need to statically allocate memory of size 100? Can we optimize memory usage using dynamic memory allocation?

Can you discard the array A completely and implement the chain (linked list) only with array B and using dynamic memory?

Practice Question 1B

IIT Bombay

- First element is B[0]
- The second element must be linked to B[0]. Let us say it is B[i]. We need to be able to compute index i using B[0]. Can we put the value of i in a memory location and store pointer pointing to this location in B[0]?
- Index of the third element must be stored in memory location pointed to by B[i].
- What will the last element point to?