

# Arrays, Linked List, Stack and Queues

What are array, linked list, stack and queues? What is the concept behind stack and queues? What is the requirement of stack and queues. If we have arrays for the concept of list then how come we require linked list. How linked list is more advantageous than array?

These are some of the questions come into a students mind when the concept of stack and linked list is introduced to them. It's really a big deal to make this concept clear to each and every student of the class. Ask a student and they will say "The most difficult chapter is array, linked list, stack and queues, I could not understand it."

I tried a lot to make this concept clear to the students using power point slides, diagrams and animations present on the Internet but then only I was not satisfied. As the diagrams, the animation, power point slides were helping to understand one or the other concept related to Arrays, linked list, stack and queues at a time but not a clear picture of overall basic concept of Arrays, linked list, stack and queues. Some of the questions asked by the students were remain unanswered with the help of power point or other technological tool. I was searching for better way to make students understand about the concept.

In one of my class on linked list, it just struck to my mind and I took example of students sitting in a row in the class. Just that !!!!!!!!!!!!!

To my surprise, all the questions asked by the students got answers using this example. In this batch of XII class, now nobody says that we don't know the concept of arrays, linked list, stack and queues. They are satisfied and moreover I am satisfied this way of teaching arrays, linked list stack and queues.

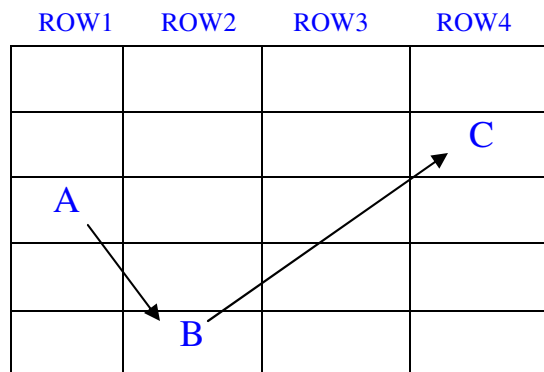
Arrays and linked list are data structures used to represent list in C++ programming.

Arrays allocate contiguous memory but linked list has non contiguous memory allocation

To make this concept clear, I ask a whole row of the students in the class to stand up and showed the students that this is the concept of array where every item has to be adjacent to each other at one place that is contiguous memory allocation

Then I ask some of the students from the class to stand up haphazardly from different rows and told them to call the name of the student given to them by me. Like 'A' student from row1 will call the name of 'B' student in row2 then B student will call the name of 'C' student in row4 and so on. Then I told them this is the concept of linked list where items of the list don't need to be at one place and there are join with pointers where pointers have the address of next item in the linked list as here each student has the name of next student they have to call.

ROW1	ROW2	ROW3	ROW4
			*
			*
			*
			*
			*



If array is there than what is the need of linked list?

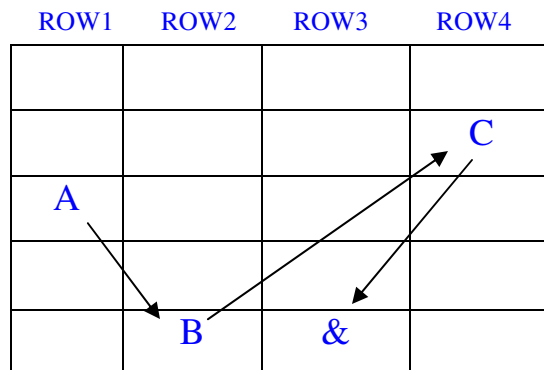
Array is static in nature and linked list is dynamic in nature.

To make this concept clear to them, again I make students of a row1 to stand up and ask a student of row2 to come and sit in row1 which is fully filled. He was not able to sit as there was no space. This is the concept of array if there is a space for 5 items then we can't increase the space as per our requirement at run time. That is array is static in nature

Then I again make students stand haphazardly and told them the names of next student. I ask that student from row2 to now sit on any other empty seat in the class. Those student who were standing, I told to the last student (who has not called any other student) to call the name of the student who has just be seated from row2 to any other empty seat. This is the concept of linked list where new item got the space as per the requirement and linked to the linked list by pointers. Linked list is dynamic in nature.

ROW1	ROW2	ROW3	ROW4
*	&		
*	&		
*	&		
*	&		
*			

& No Space

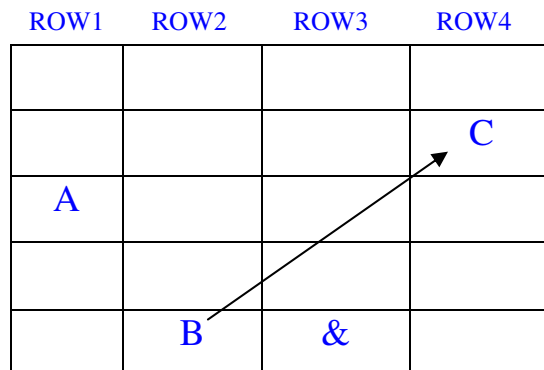
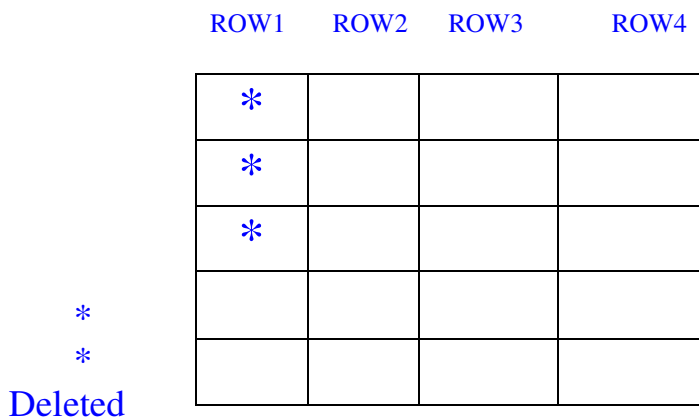


& got the space

Stack has the concept of Last in first out (LIFO)

Stack is a concept where the item last entered is deleted first.

To make this concept of stack clear I told the student to sit in a row one by one. Then ask the last student who sat in a row to stand up and come out of the row. Then again ask the second last student to come out. This is the concept of Last in First out in a stack. Stack can be implemented both using arrays and linked list.

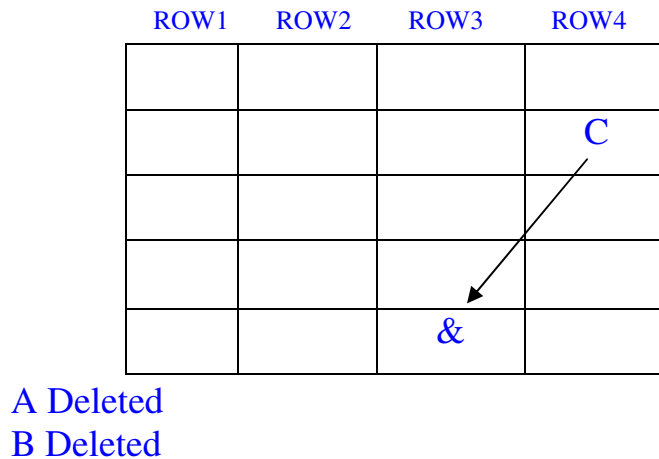
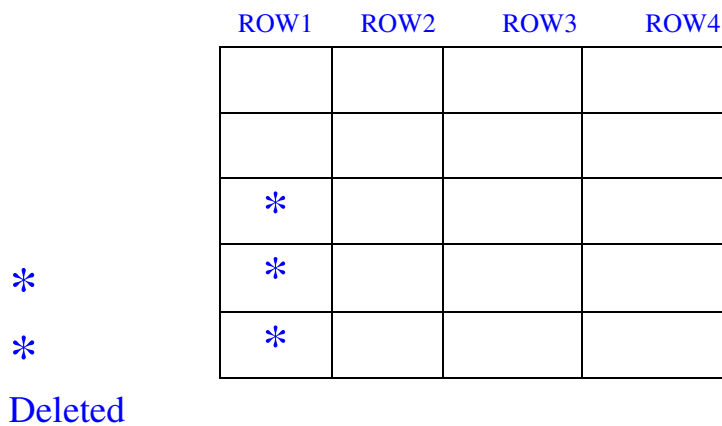


& C Deleted

Queue has the concept of First in first out (FIFO)

Queue is a concept where the item first entered is deleted first.

To make this concept clear I told the students to sit in a row one by one. I ask first student of the row to stand up and come out. Then again I ask next first student of the row to stand up and come out. This is the concept of First in first out in a queue. Queue can be implemented both using arrays and linked list



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