

Universidade Federal de Ouro Preto

Lecture Notes

Graph Representation

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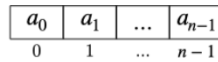
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Source



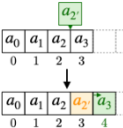
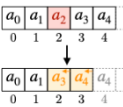
- Arrays <https://superstudy.guide/algorithms-data-structures/data-structures/arrays-strings>
- Stacks and Queues <https://superstudy.guide/algorithms-data-structures/data-structures/stacks-queues>

1 Arrays

An array is a collection of elements of the same data type that are stored together in contiguous memory locations and can be accessed using an index or a subscript.

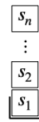


1.1 Array operations

Type	Time	Description	Illustration
Access	$O(1)$	Using index i , we can directly access the i th element of the array with $A[i]$.	
Search	$O(n)$	We need to search the array by checking each element one by one until finding the desired value.	
Insertion	$O(n)$	1. Elements at indices i and up are moved to the right. 2. The new element is inserted at index i . <i>Note that if there is no space for the new element to be added in the existing array, we need to create a bigger array and copy existing elements over there.</i>	
Deletion	$O(n)$	1. Elements at indices $i+1$ and up are moved to the left. 2. The former last element of the array is either ignored or removed.	

2 Stacks (Pilha pt-BR)

A stack is an abstract data type that represents a collection of elements with a particular set of operations. It is based on the principle of Last-In-First-Out (LIFO), which means that the last element added to the stack is the first one to be removed.

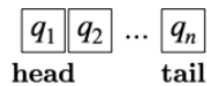


2.1 Stack operations

Push	Pop
Insert an element on the top of the stack.	Remove the element from the top of the stack and return its value.
<p>A stack of boxes labeled s_1, s_2, s_3 from bottom to top. A new box labeled s_4 is shown to the left with an arrow pointing to a new green dashed box being added on top of s_3.</p>	<p>A stack of boxes labeled s_1, s_2, s_3, s_4 from bottom to top. The top box s_4 is highlighted in red. An arrow points from this box to a separate box labeled s_4 to the right, indicating its removal.</p>

3 Queues (Fila pt-BR)

A queue is an abstract data type that represents a collection of elements with a particular set of operations. It is based on the principle of First-In-First-Out (FIFO), which means that the first element added to the queue is the first one to be removed.



3.1 Queue operations

Enqueue	Dequeue
Insert element at the tail of the queue.	Remove element from the head of the queue.
<p>A queue of boxes labeled q_1, q_2, q_3. A new box labeled q_4 is shown to the right with an arrow pointing to a new green dashed box being added at the end of the queue.</p>	<p>A queue of boxes labeled q_1, q_2, q_3, q_4. The first box q_1 is highlighted in red. An arrow points from this box to the left, indicating its removal from the head of the queue.</p>