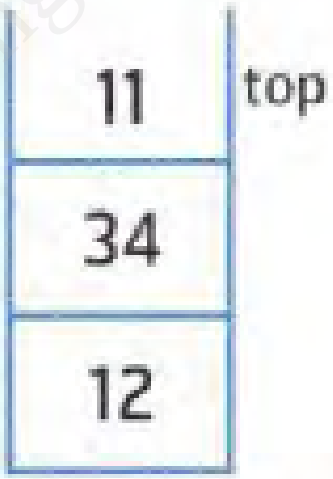
# Data Structures

Ho Dac Hung

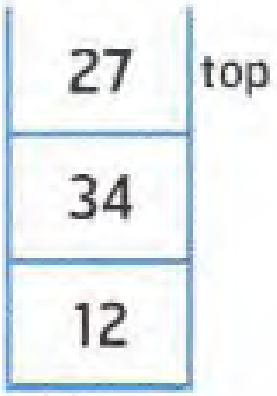
# The Stack Data Structure

- The data structure organizes data. The stack data structure can contain many data items just as an array can. Additionally, it has a set of operations that can be performed on the data.
- A stack structure has a top.



# The Stack Data Structure

- There are two standard operations that can be performed on the items in a stack, and only the top item of a stack can be processed.
- The pop operation removes the top item.
- The push operation add an item to the top of the stack.

# The Stack Data Structure

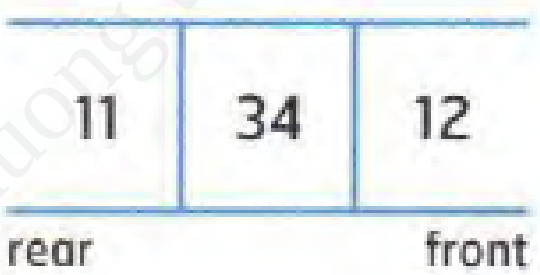
- Other stack operations include the isEmpty query, which returns true when there are no items in the stack, and false otherwise.
- The size operation determines the number of items in a stack.
- A stack can be emptied with the makeEmpty operation.

# The Stack Data Structure

- Since the stack is desiged so that the last item pushed on is the first item to be popped, it is sometimes referred to as a last in first out (LIFO) data structure.

# The Queue Data Structure

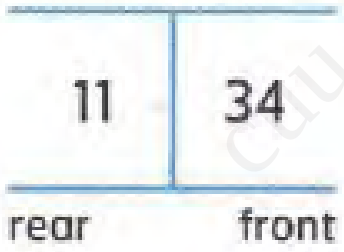
- A queue is a data structure similar to a stack in that it holds a number of data items. However, one end of the queue is referred to as the rear and the other end the front.

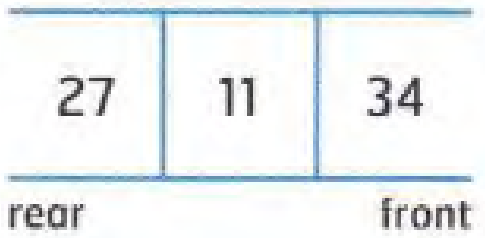



- All insertions are made at the read and all removals are made at the front.

# The Queue Data Structure

- There are two standard operations that can be performed on a queue.
- The dequeue operation removes an item from the front.
- The enqueue operation adds an item to the rear.



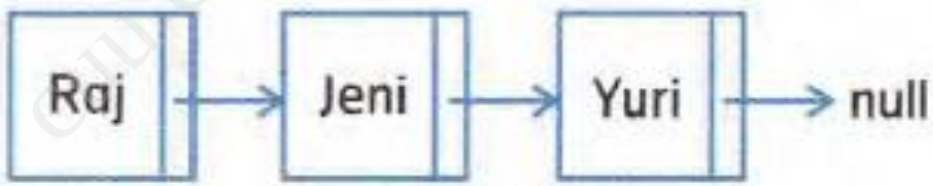



# The Queue Data Structure

- A queue is analogous to a line at a ticket counter where first come first serve, and is sometimes referred to as a first in first out (FIFO) data structure.

# The Linked List Data Structure

- Another way of storing lists of data in memory requires each item to store information that indicates where the next item is stored. The additional information is a reference, or pointer, to a data location. This kind of list data structure called a linked list.

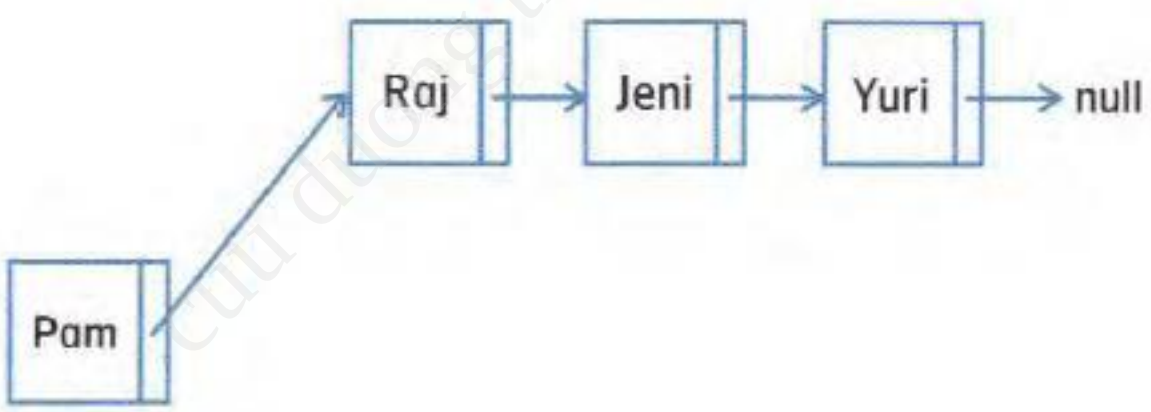


# The Linked List Data Structure

- The first item in a linked list is called the head,
- The last item points to a null and is called the tail.
- Each element of a linked list is called a node.

# The Linked List Data Structure

- There are two standart operations that can be performed on a linked list.
- The addAtFront operation adds a new node to the front of the list.



# The Linked List Data Structure

- The remove operation removes an item from the linked list. Removing an item from a linked list means that the pointer of the previous item is change to point to the item after the one to be removed.