Heap-Allocated Memory and Box & Arrow Diagrams

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1.

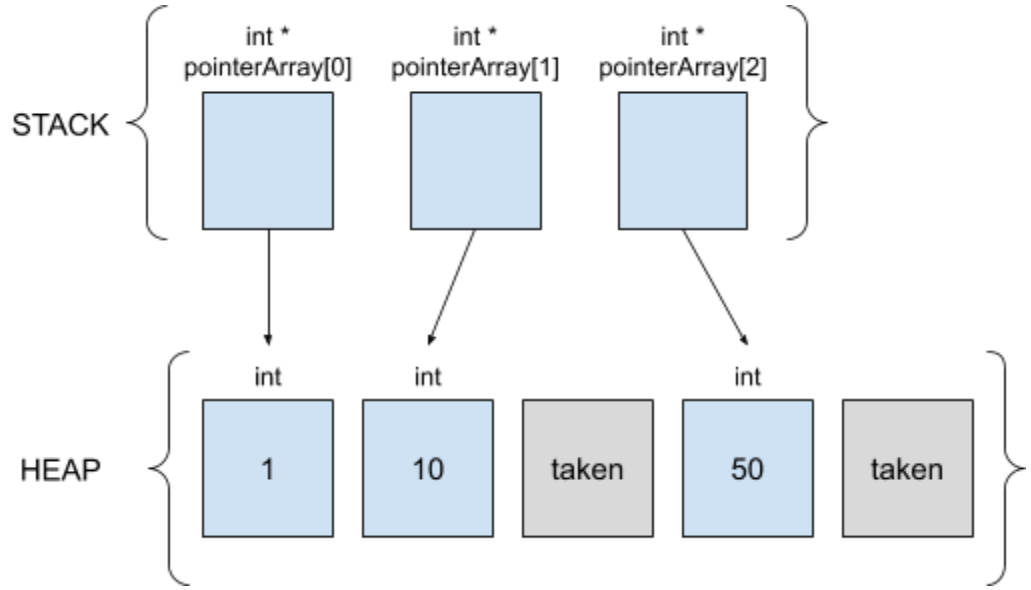
You can tell a value is stored on the stack when it is assigned directly to a variable declared in a function, which runs at compile time.

Memory for a variable on the stack gets deleted when that variable's function finishes execution.

You can tell a value is stored on the heap when it is assigned to a pointer variable's pointee (using the dereference operator *). The pointer needs to have been declared using the **new** operator, to reserve space for the value on the heap.

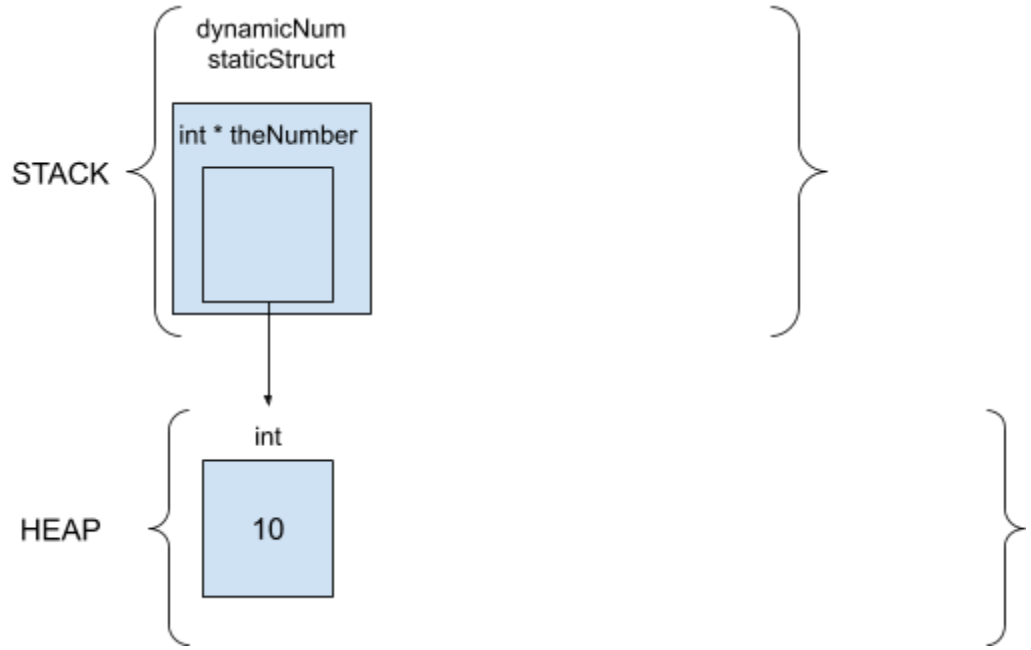
Memory for a value on the heap gets deleted when we delete any pointer pointing to that address (using the **delete** operator).

2.

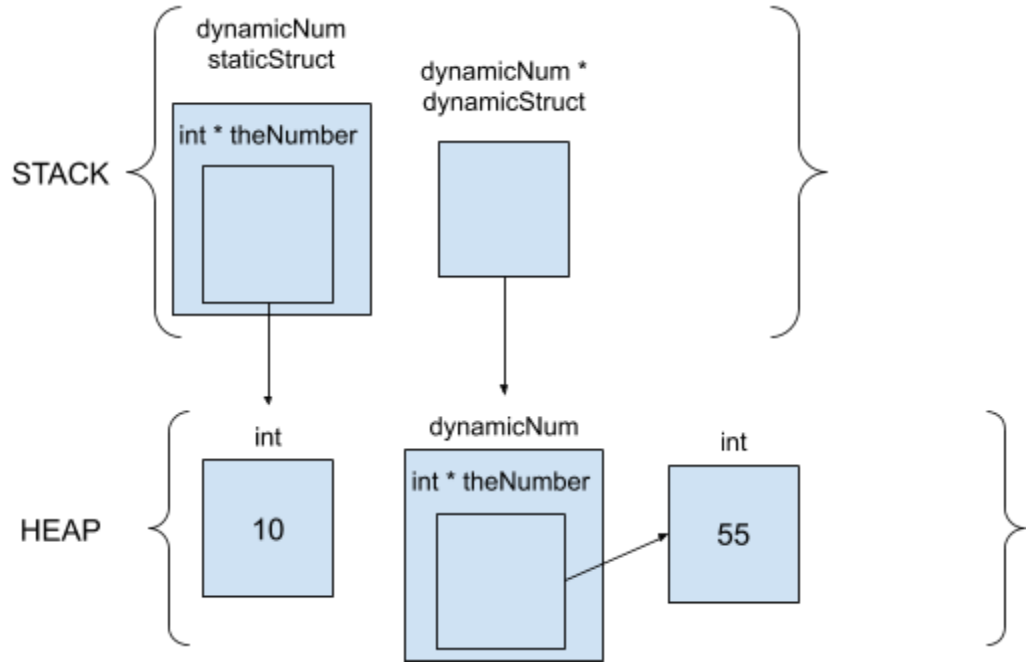

STACK
int *
pointerArray[0]
int *
pointerArray[1]
int *
pointerArray[2]
HEAP
int
1
int
10
taken
int
50
taken

3.

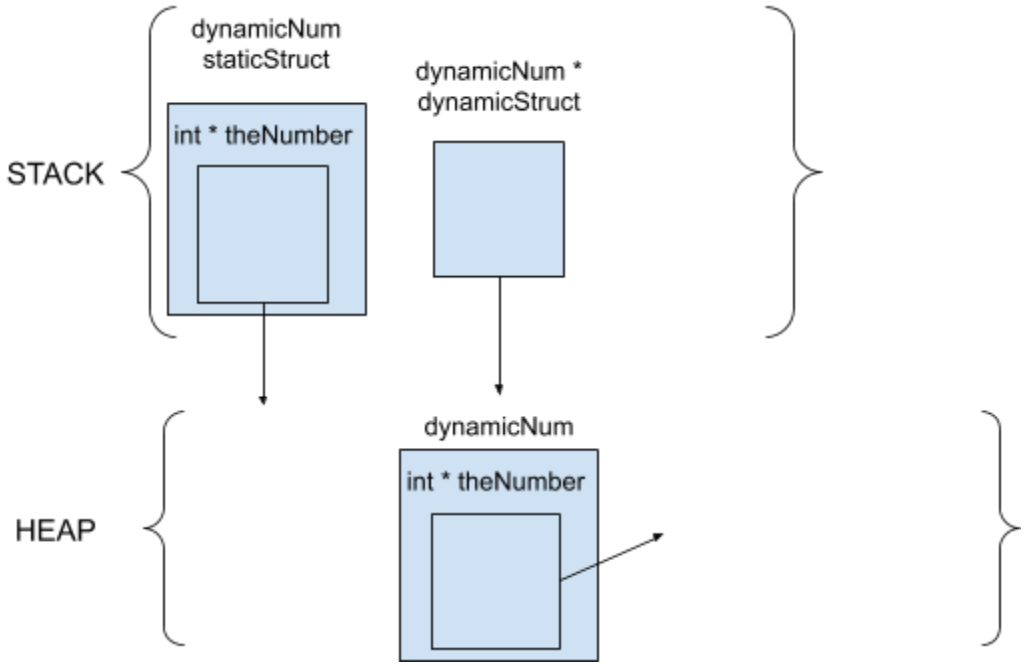
i.


dynamicNum
staticStruct
int * theNumber
STACK
int
HEAP
10

ii.


dynamicNum
staticStruct
int * theNumber
dynamicNum *
dynamicStruct
STACK
int
10
dynamicNum
int * theNumber
int
55
HEAP

iii.


dynamicNum
staticStruct
int * theNumber
dynamicNum *
dynamicStruct
STACK
dynamicNum
int * theNumber
HEAP