MAKE SCHOOL

LINKED LISTS AND HASH TABLES

Data Structures for to Make Life Betterer!

CHOOSE THE RIGHT TOOL FOR THE JOB

It’s all about the context.

What is the shape of the data?

What are the constraints?

Which operations need to be fast?

LINKED LISTS

QUICK REVIEW - ARRAYS

Contiguous piece of memory

Same size storage space at each index

Static - Memory allocated once, size can’t change

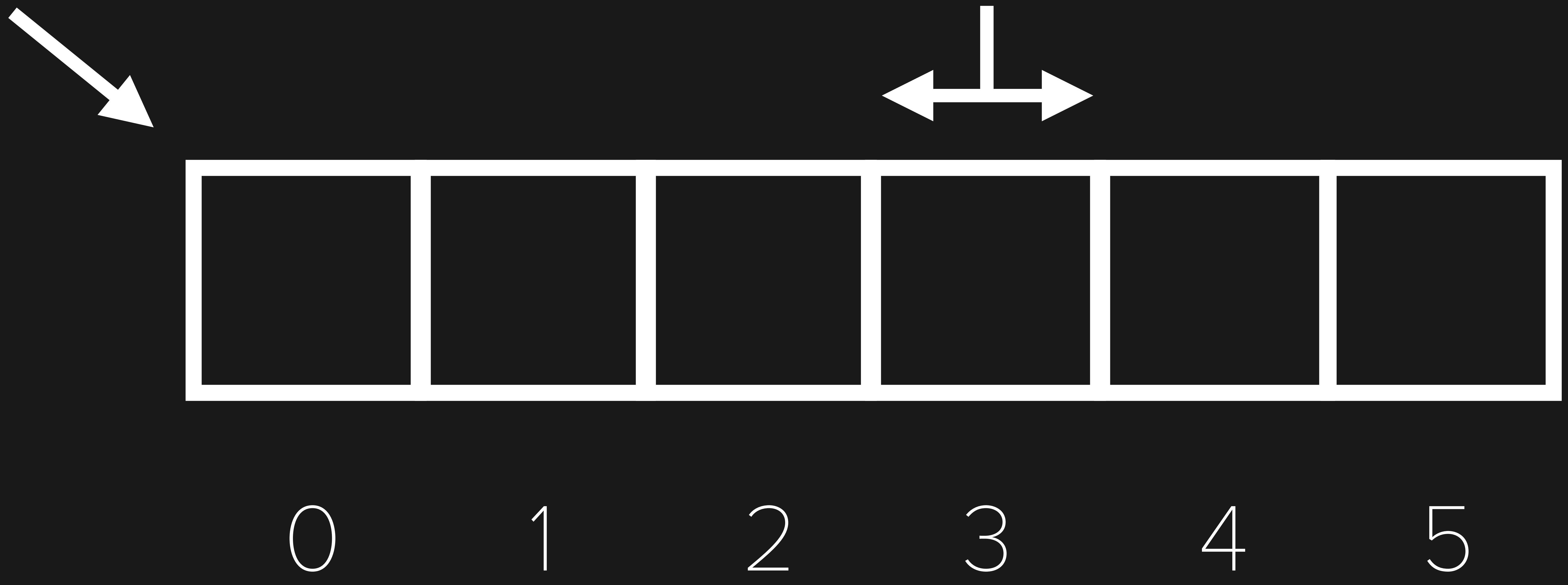
Dynamic - New memory allocated, array copied to grow

Address

`A[0] = 2000`

Size

`S = 6`



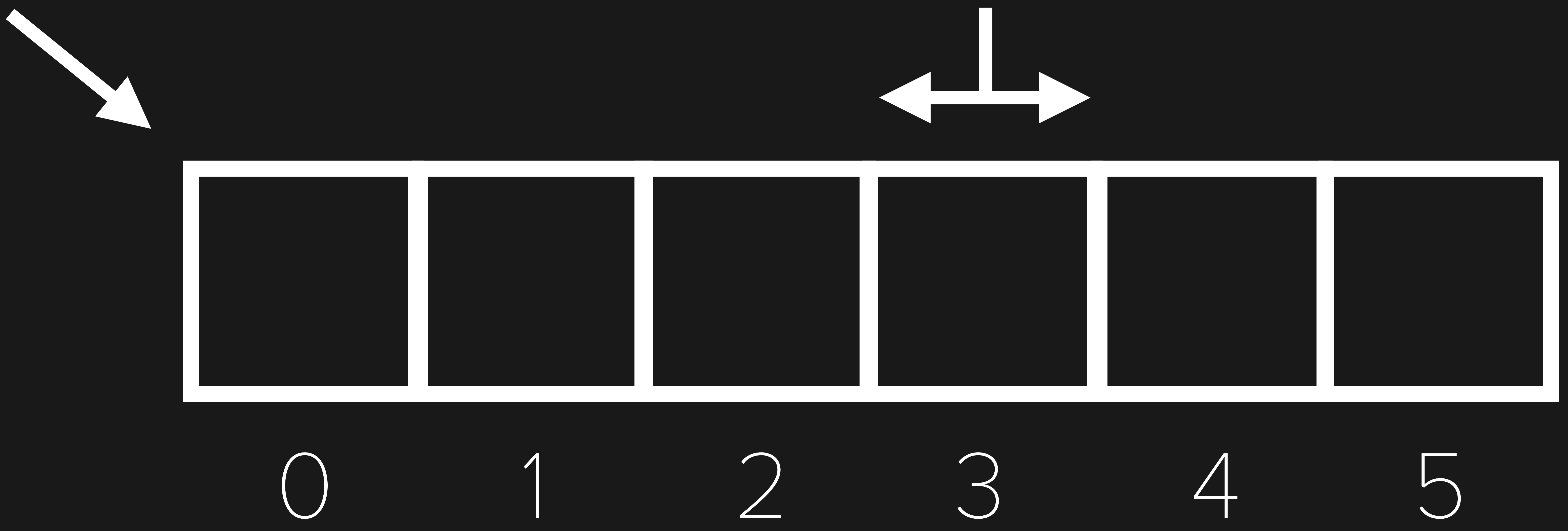
Equation to find memory location for index 4?

Address

A[0] = 2000

Size

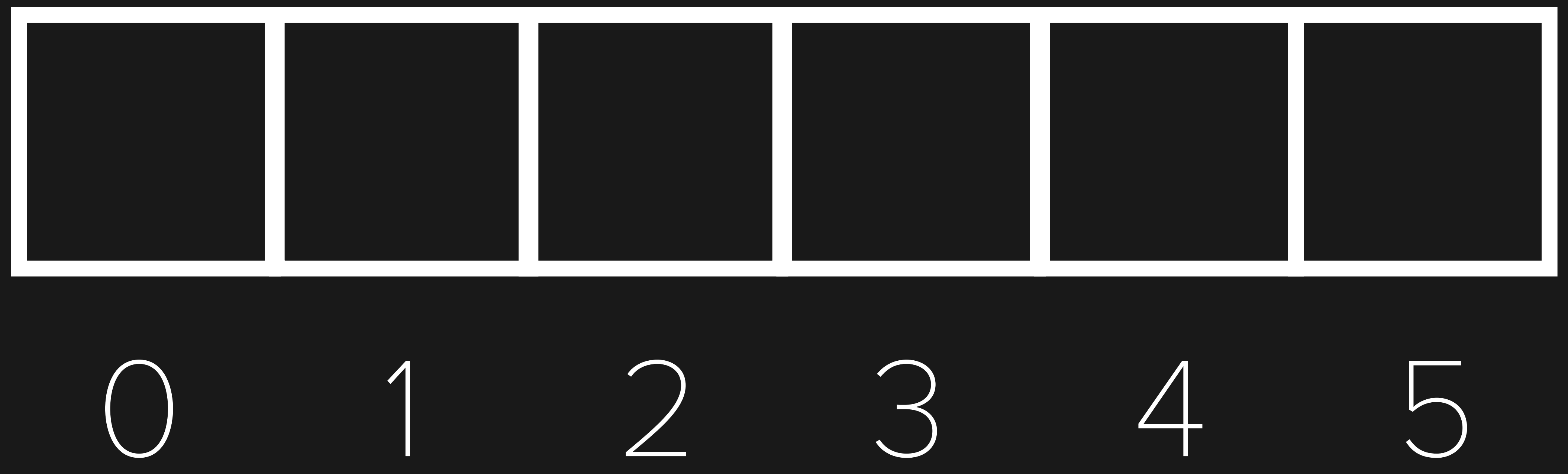
S = 6



```
A[i] = A[0] + s * i
A[4] = 2000 + 4 * 6
A[4] = 2024
```

DYNAMIC ARRAY RUNTIME

Operation	Worst Case
Access Element Via Index	O(1)
Insert or Delete Element (Beginning, Middle)	O(n)
Insert or Delete Element (End)	O(1)



LINKED LISTS

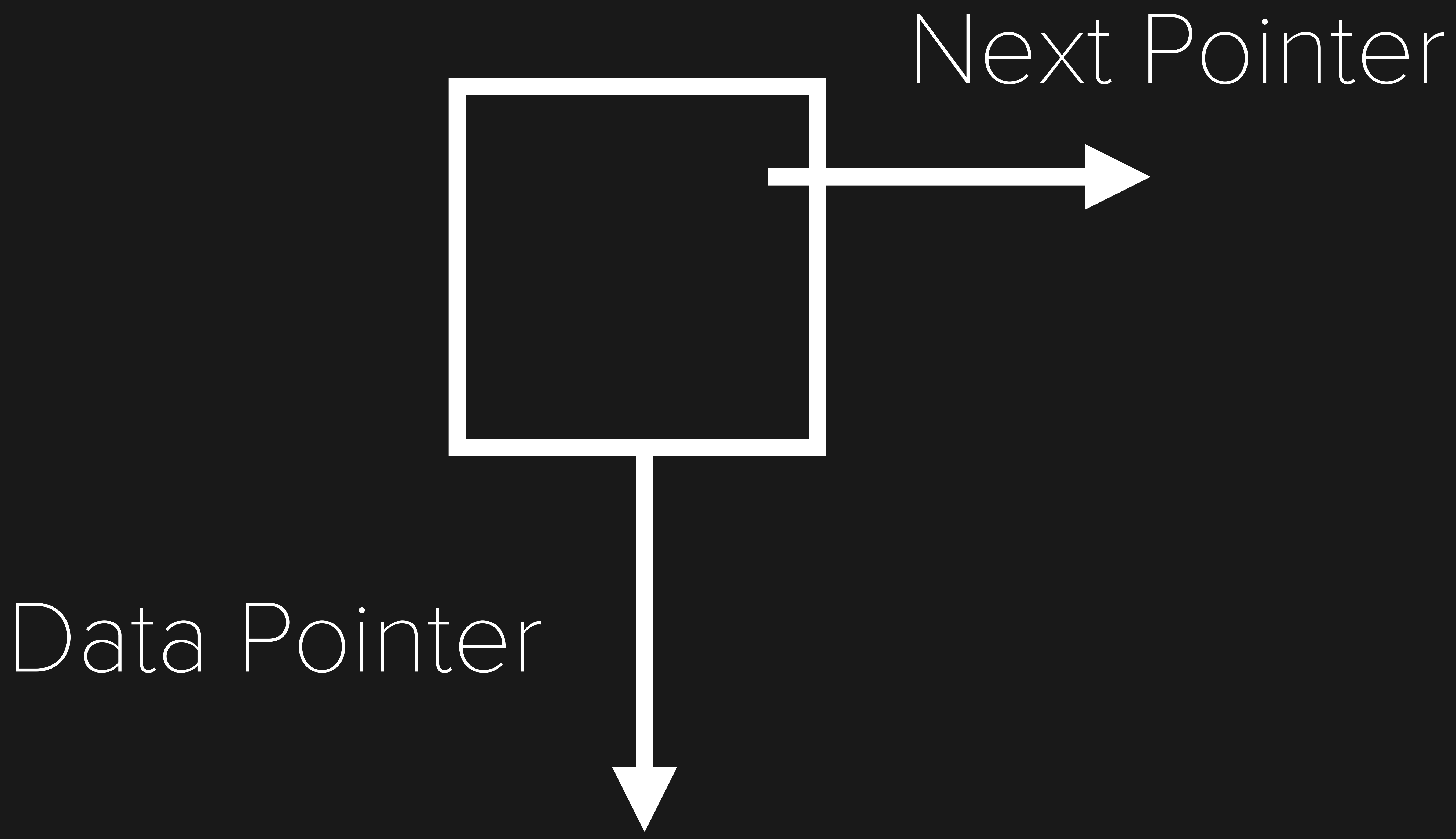
Not contiguous piece of memory

Differing size storage space at each index

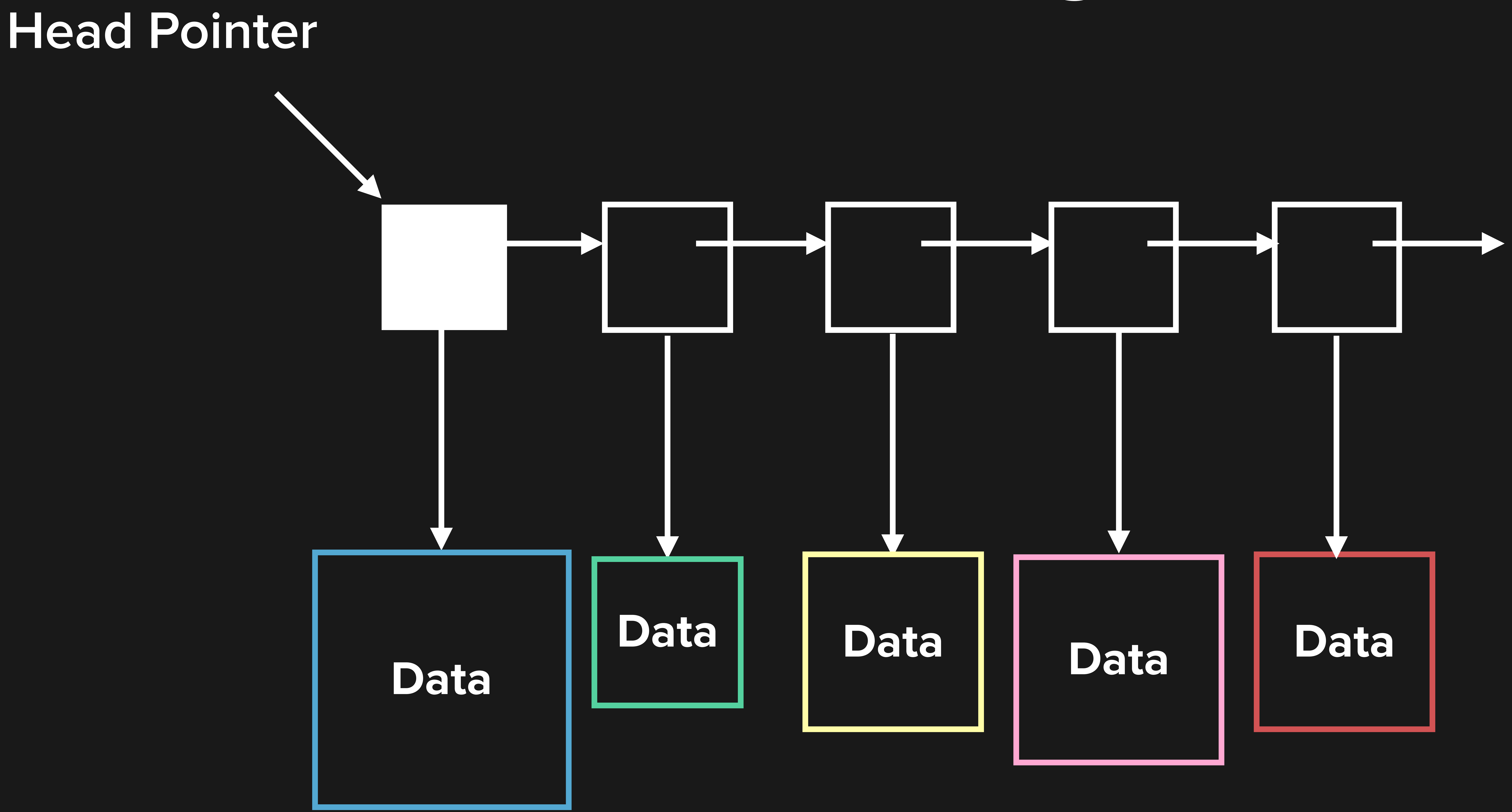
Dynamic - New (small) piece of memory allocated

No need to copy the whole thing like an array

NODE

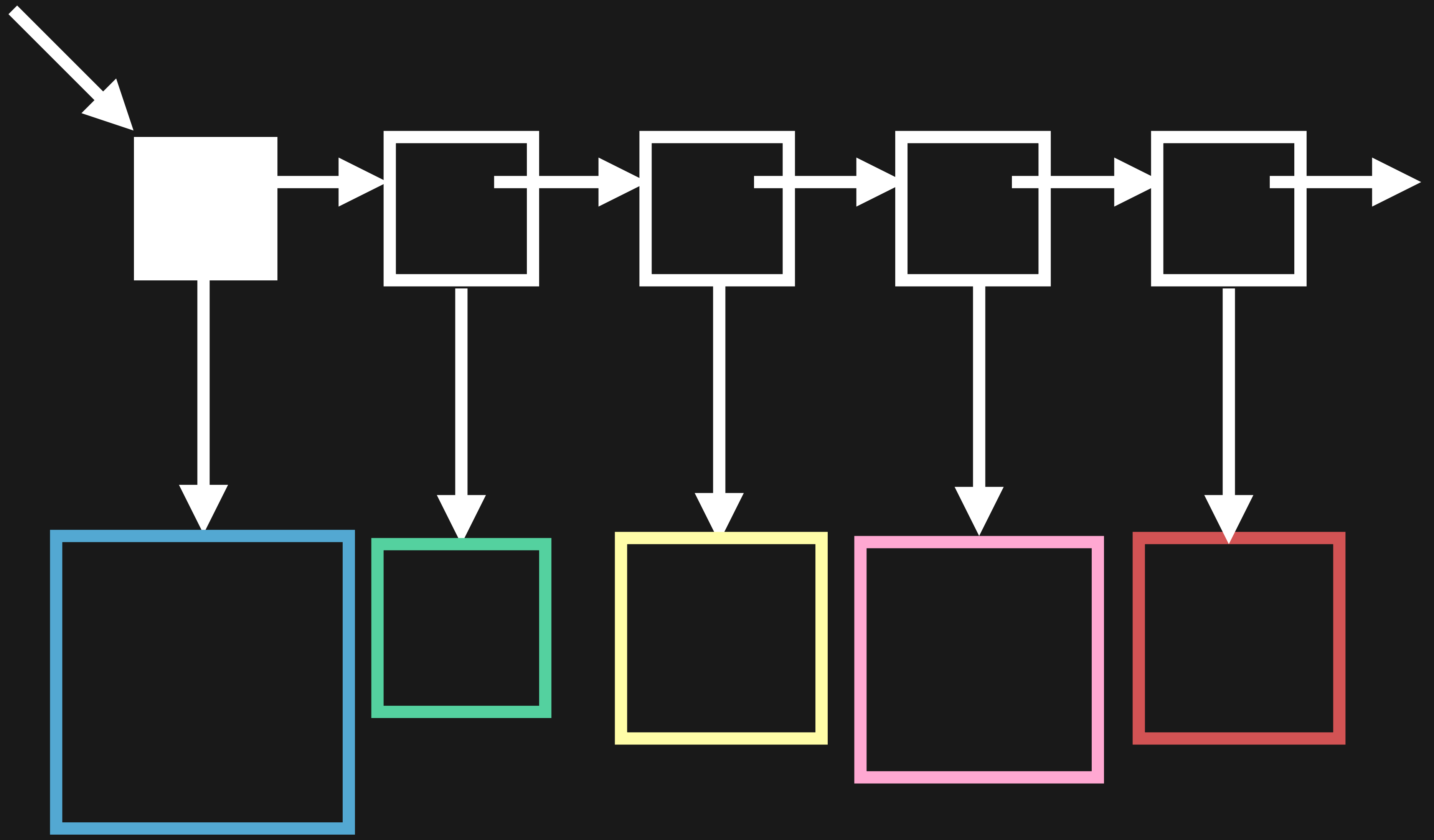


LINKED LIST

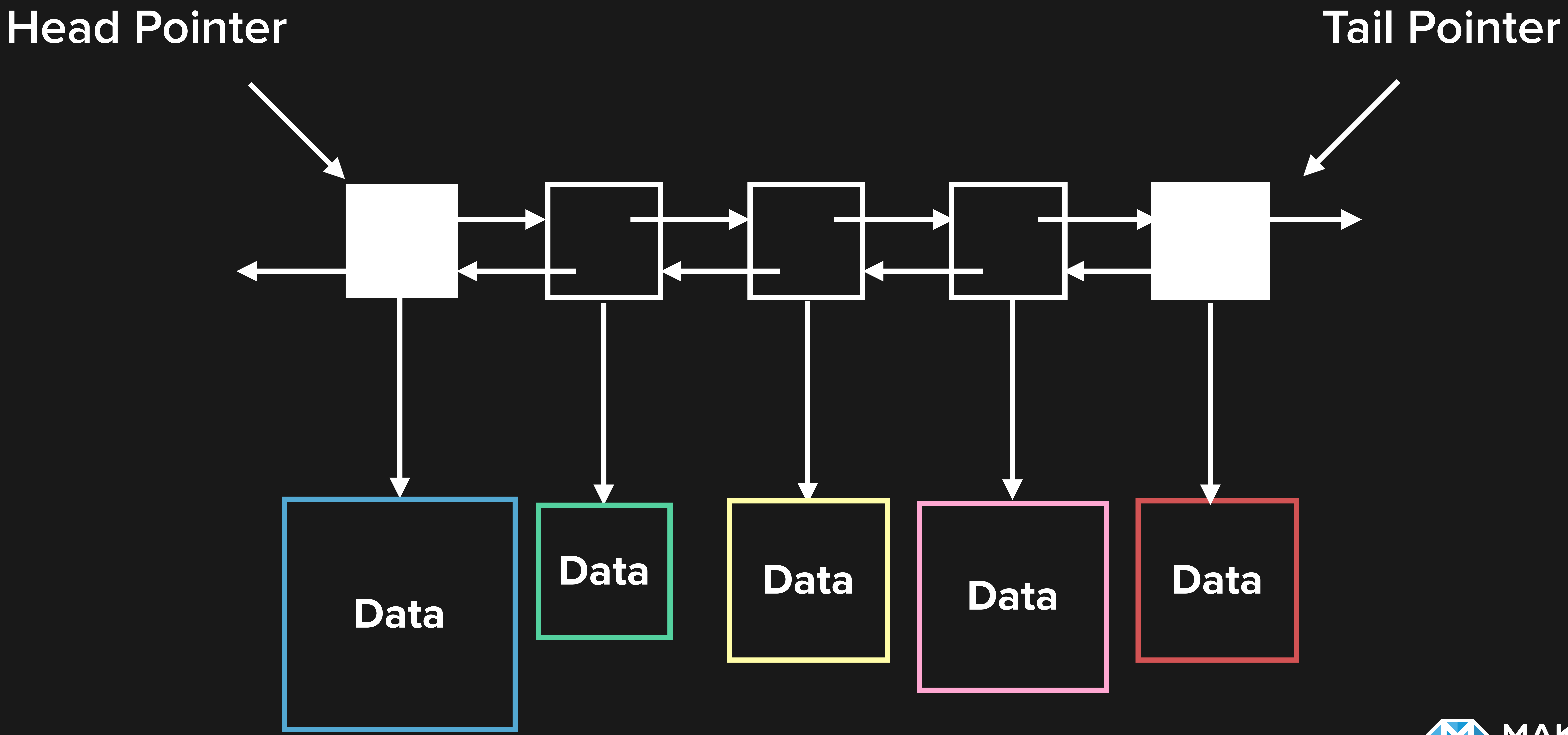


LINKED LIST RUNTIME

Operation	Worst Case
Access Element Via Index	O(n)
Insert or Delete Element (Beginning)	O(1)
Insert or Delete Element (Middle)	O(n)
Insert or Delete Element (End)	O(n)

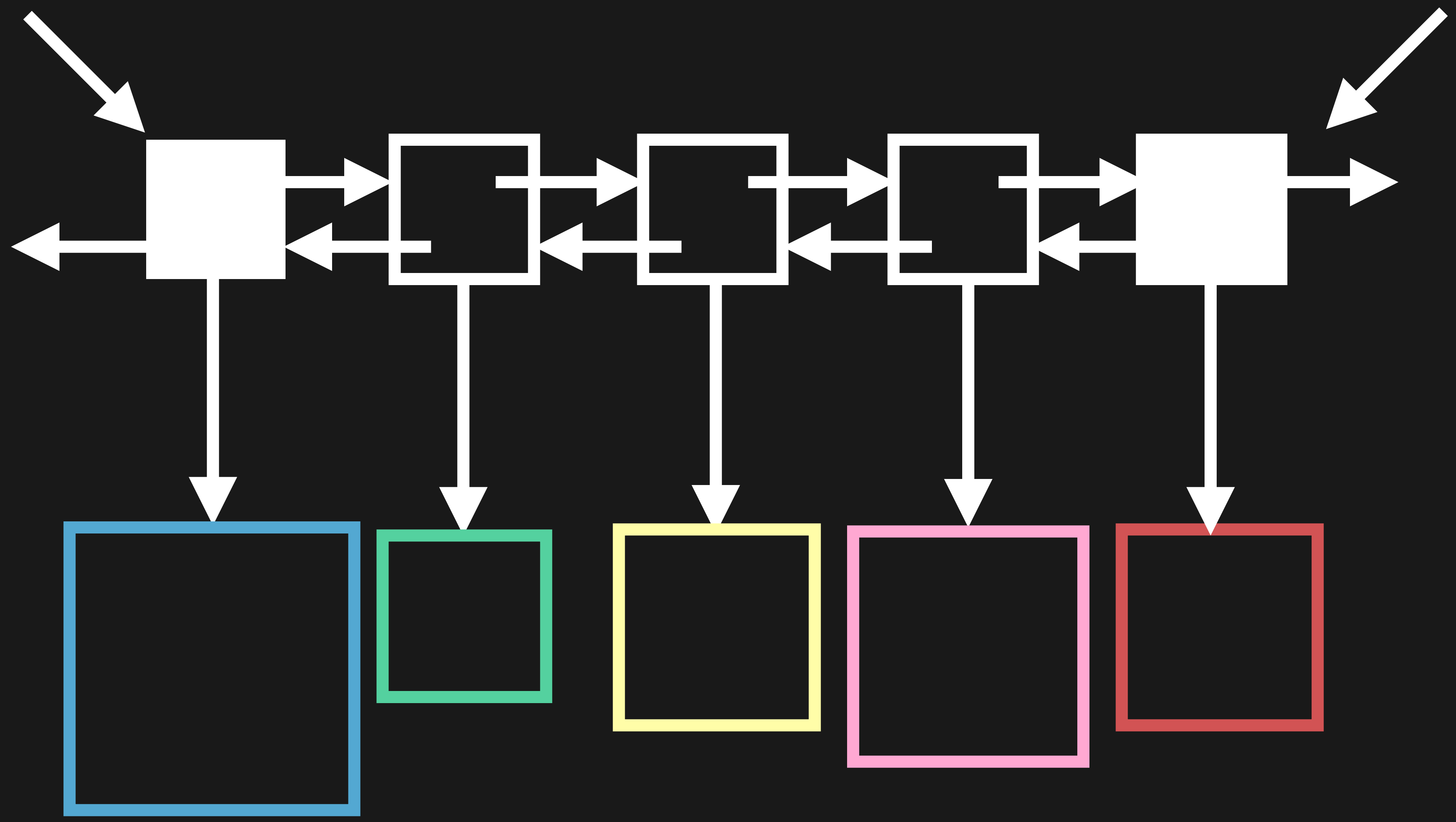


DOUBLY LINKED LIST



DOUBLY LINKED LIST RUNTIME

Operation	Worst Case
Access Element Via Index	O(n)
Insert or Delete Element (Beginning)	O(1)
Insert or Delete Element (Middle)	O(n)
Insert or Delete Element (End)	O(1)



A LINKED LIST IS LIKE A FREIGHT TRAIN

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