Basic Data Structures I

Arrays & Linked Lists

ADT: Abstract Data Type

→ specify the operations
but the implementation

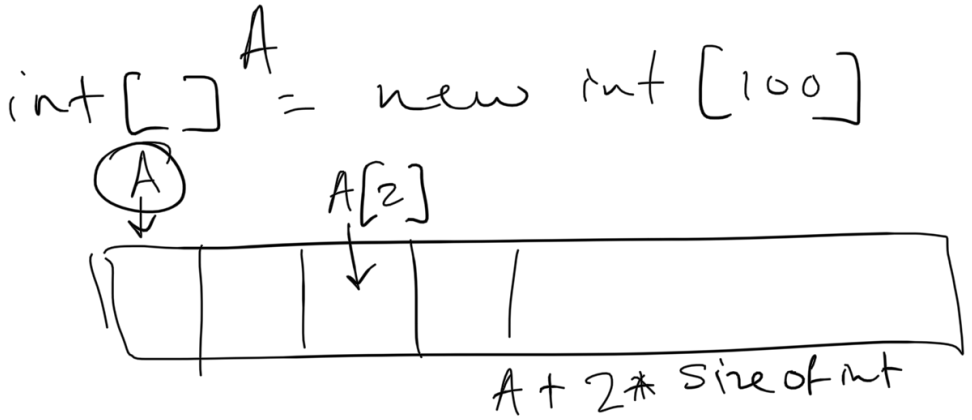
The List ADT

→ can hold multiple items

→ "ordered" → every element has a position

operations: append, set/get
remove
iterate
contains
size
empty

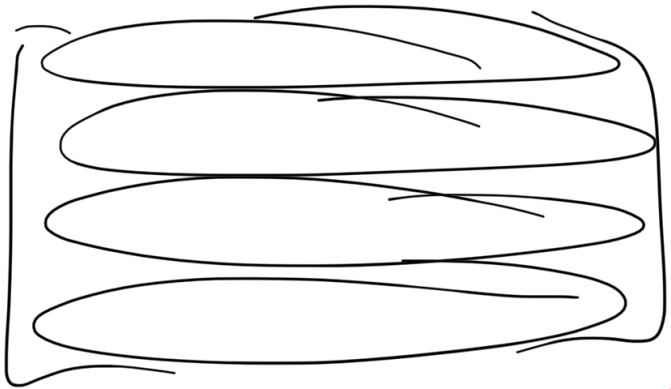
Arrays



→ fixed size

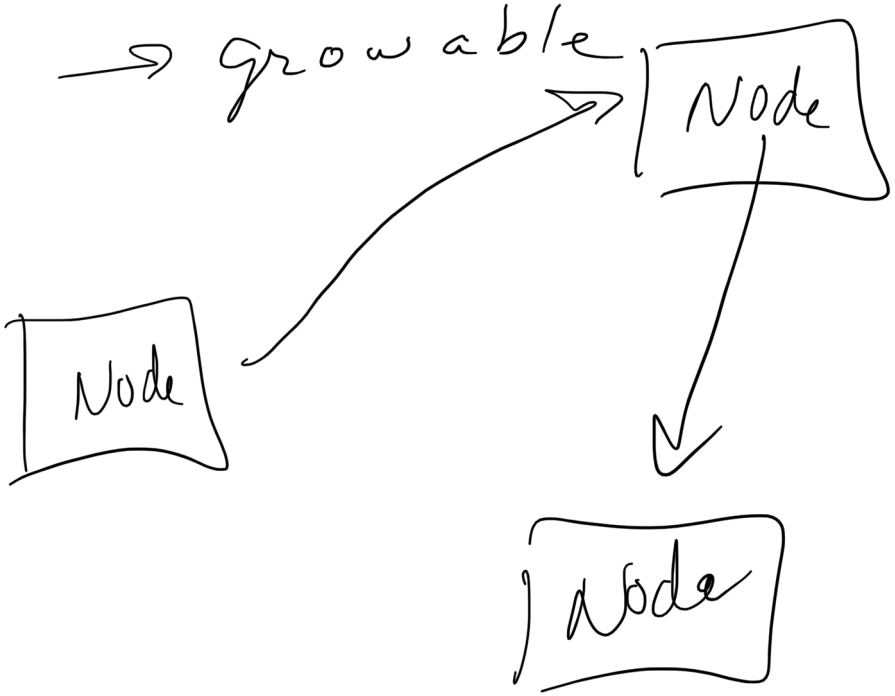
→ indexing

→ contiguous block of memory



(Singly) Linked Lists

no indexing



Arrays vs. Linked Lists

Arrays

good
- indexing

bad
- resizing (fixed size)
- removing from middle
- adding to middle

Linked Lists

good
- * insertion / deletion from middle (w/o shifting)
- adding / removing to front / back → O(1)

bad
- no indexing

→ more space
→ more time for iteration

What are some things that can be done more easily or more efficiently with an array than with a linked list?

binary → array

sorting? → array

stack → array, linked list

tree structures → *

What are some things that can be done more easily or more efficiently with a linked list than with an array?