

# List ADT:

State  $S$ : a sequence of elements  $x_0, x_1, \dots, x_{n-1}$

Operations:

- $size()$  - return  $n$
- $isEmpty()$  - return  $n == 0$
- $get(i)$  - return  $x_i$ .
- $add(i, x)$  - update state to  $x_0, x_1, \dots, x_{i-1}, x, x_i, \dots$
- $remove(i)$  - update state to  $x_0, x_1, \dots, x_{i-1}, x_{i+1}, \dots, x_{n-1}$

## Simple List Interface

↳ as an interface, it doesn't have much code itself  
↳ bulk of code is mostly comments

Interface specifies functionality, Class provides it.

## Arrays

"contiguous block of elements" (fixed size)

Jav: `Object[] data = new Object[10]` ← array size

- set value → `data[3] = something`
- get value → `variable = data[3]`

## Implementing SimpleList string elements in Array

How to  $get(i)$ ?

→ return `data[i]`

How big to make `data`?

→ as big as needed (resize if needed).

How to  $add(i, x)$ ?

→ Resize array as needed, shift  $x_i \dots x_{n-1}$ , set  $i$ th to  $x$ .

How to  $remove(i, x)$ ?

→ Copy all elements from  $i+1$  to  $n-1$  to one index below & resize

## Linked List (conceptually)

→ Stores collection of items

- each item stored in node

- Node stores reference to next node