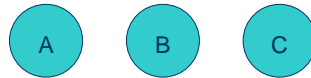


ADT Sequence & its implementation

Operations

- Create / remove
- Add / remove element
- Membership (T|F)
- Cardinality (# elements)
- Is_empty: $S \rightarrow T|F$
- Is_pos_valid: $S \times p \rightarrow T|F$
- Find element at position p
 - Find: $S \times p \rightarrow e$
- Find position of an element
 - Find: $S \times e \rightarrow p$
- Find first / next / last element
- Find first / last position

Abstract sequence



Properties

- Successor
 - Except the last
- Predecessor
 - Except the first

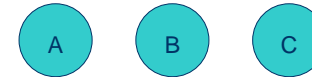
1

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ADT Sequence / Implementation

Implementation 1 - array

Abstract sequence



- Successor - implicit
- Predecessor - implicit

A
B
C

2

22/09/2008

ADT Sequence / Implementation

Implementation 2 - array

Abstract sequence



- The reference might be
 - An index into the array
 - A name \rightarrow lookup

- Successor - explicit
- Predecessor - implicit

node	succ
A	Ref B
B	Ref C
C	α

3

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ADT Sequence / Implementation

Implementation 3 - array

Abstract sequence



- Successor - explicit
- Predecessor - explicit

- The reference might be
 - An index into the array
 - A name \rightarrow lookup

node	succ	pred
A	Ref B	α
B	Ref C	Ref A
C	α	Ref B

4

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ADT Sequence / Implementation

Implementation 4 – singly linked list

- Abstract sequence
- Successor – explicit
- Predecessor – implicit



- The arrow is a reference to an element (pointer)

5

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ADT Sequence / Implementation

Implementation 5 – doubly linked list

- Abstract sequence
- Successor – explicit
- Predecessor – explicit



- The arrow is a reference to an element (pointer)

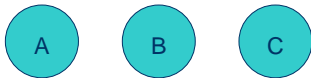
6

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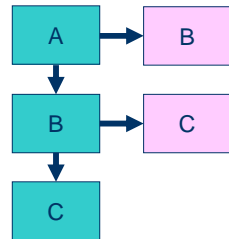
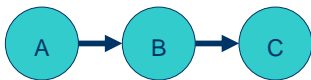
ADT Sequence / Implementation

Implementation 6 – directed graph – adjacency list

- Abstract sequence
- Successor – explicit
- Predecessor – implicit



- Graph



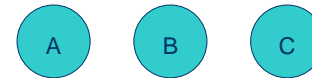
7

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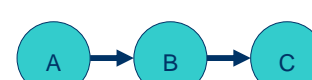
ADT Sequence / Implementation

Implementation 7 – directed graph – adjacency matrix

- Abstract sequence
- Successor – explicit
- Predecessor – implicit



- Graph



	A	B	C
A	0	1	0
B	0	0	1
C	0	0	0

8

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ADT Sequence / Implementation