DESIGN AND ANALYSIS OF ALGORITHMS

Arrays and lists

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Sequences of values

* Two basic ways of storing a sequence of values

    * Arrays

    * Lists

* What's the difference?

Arrays

* Single block of memory

  * Typically fixed size

* Indexing is fast

  * Access A[i] in constant time for any i

* Inserting an element between A[i] and A[i+1] is expensive

* Contraction is expensive

Lists

* Values scattered in memory

    * Each element points to the next—"linked" list

    * Flexible size

* Follow i links to access A[i]

    * Cost proportional to i

* Inserting or deleting an element is easy

    * "Plumbing"

Operations

* Exchange A[i] and A[j]

    * Constant time in array, linear time in lists

* Delete A[i] or Insert v after A[i]

    * Constant time in lists (if we are already at A[i])

    * Linear time in array

* Algorithms on one data structure may not transfer to another

    * Example: Binary search