NPTEL MOOC,JAN-FEB 2015
Week 2, Module 1

# DESIGN AND ANALYSIS OF ALGORITHMS

## Arrays and lists

MADHAVAN MUKUND, CHENNAI MATHEMATICAL INSTITUTE
http://www.cmi.ac.in/~madhavan

# 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