sit with your clan
if you can

CMPS 12B/M
Introduction to Data Structures

- Instructor: Nathan Whitehead

Vote for Lab Times

Piazza poll for potential new lab:

- Monday, 6pm-8pm
- Tuesday, 8am-10am
- Wednesday, 6pm-8pm
- Thursday, 8am-10am
- Friday, 5pm-7pm

How many people are signed up for a lab but actually have a conflict?

Data Structures

- What do they do?

Data as Cards

- Data can represent things
  - external to computer
  - meaningful to people
- Like a stack of cards
- What can you do?
  - Write things on a card
  - Find desired cards
  - Insert new cards
  - Delete existing cards
  - Organize cards using different systems

Data Structures

- Think of data structures as ways of dealing with data cards
- Array
  - Fixed size numbered plastic slots
- Ordered Array
  - Keep them organized in order
- Stack
  - LIFO
- Queue
  - FIFO

More Data Structures

- Linked list
- Binary tree
- Red-black tree
- Hash table
- Heap
- Graph

each data structure has advantages and disadvantages

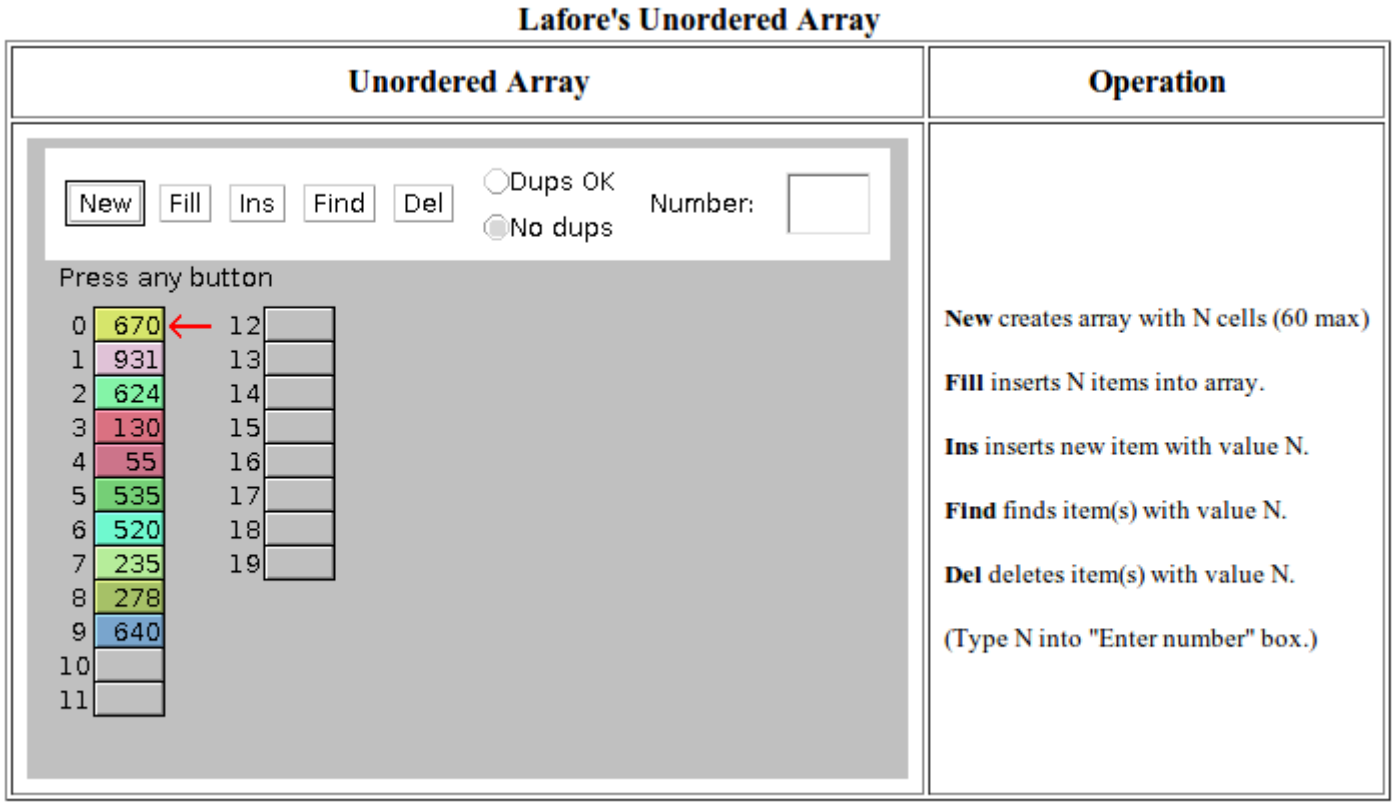
Some Definitions

- *Database*
  - All the data needed in a particular situation
- *Record*
  - One card
- *Field*
  - One part of a card
- *Key*
  - Designated field for searching and sorting

Example

- *Database*
  - All businesses in USA, names and phone numbers
- *Record*
  - One business
- *Fields*
  - Business name
  - Phone number
- *Key*
  - Business name

Unordered Array Example

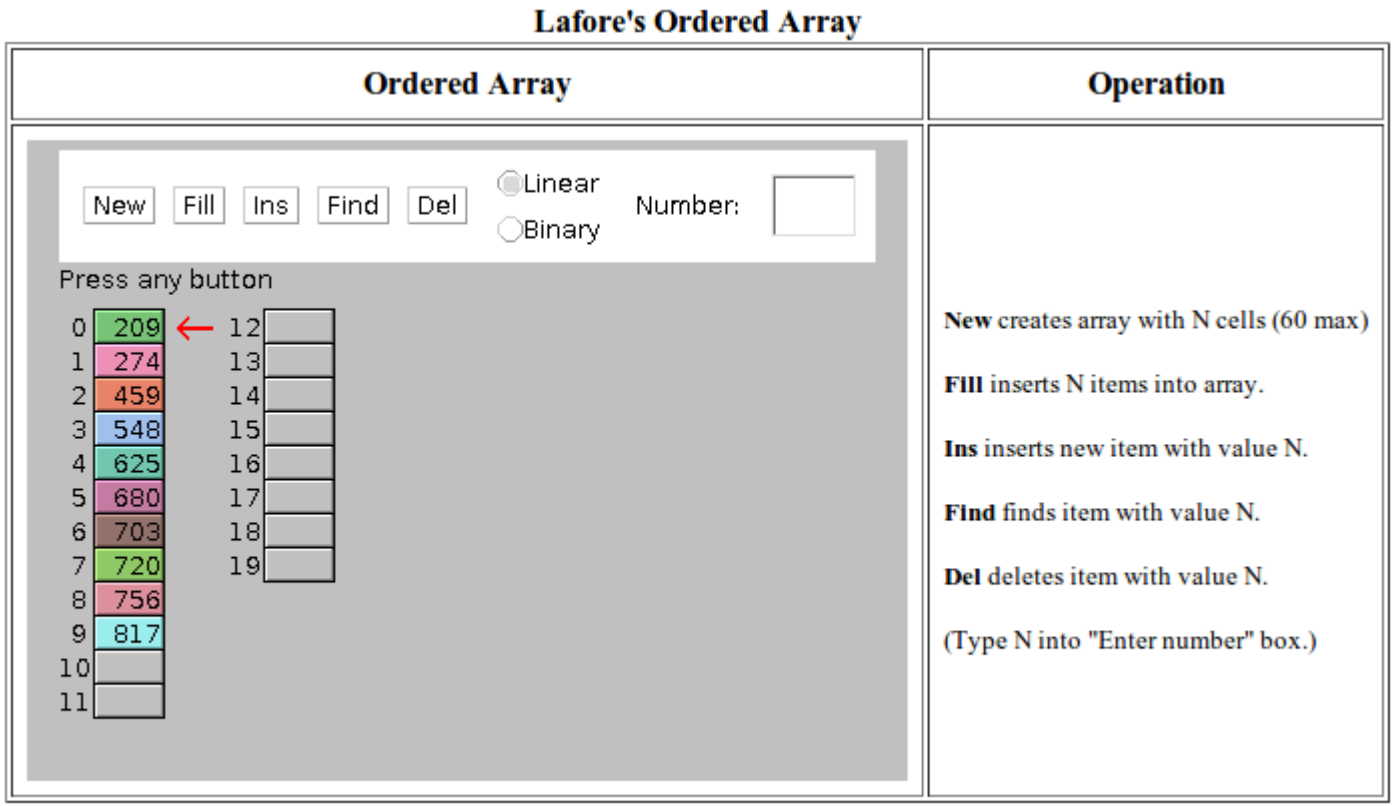


http://cs.brynmawr.edu/Courses/cs206/spring2004/lafore.html

Java code for arrays

- Array
- LowArray
- HighArray

Ordered Array



Java code for ordered arrays

- OrderedArray

How fast is HighArray?

- How many steps does it take on average to do these operations for HighArray?
  - (Assume no duplicates allowed)
  - Let *n* be number of elements in array.
  - Insert
  - Delete
  - Find

The End