Today’s Outline

- Announcements
  - Midterm #1, this Fri, Oct 19.
  - Assignment #3, due Thurs, Oct 25.
- Today’s Topics:
  - Priority Queues
    - Binary Min Heap - buildheap
    - D-Heaps

Facts about Binary Min Heaps

Observations:
- finding a child/parent index is a multiply/divide by two
- operations jump widely through the heap
- each percolate step looks at only two new nodes
- inserts are at least as common as deleteMins

Realities:
- division/multiplication by powers of two are equally fast
- looking at only two new pieces of data: bad for cache!
- with huge data sets, disk accesses dominate

Representing Complete Binary Trees in an Array

From node i:
left child: right child: parent:

implicit (array) implementation:
A Solution: $d$-Heaps

- Each node has $d$ children
- Still representable by array
- Good choices for $d$:
  - (choose a power of two for efficiency)
  - fit one set of children in a cache line
  - fit one set of children on a memory page/disk block

Operations on $d$-Heap

- Insert : runtime =
- deleteMin : runtime =