CS 367 - Introduction to Data Structures
Tuesday, April 26, 2016

Program 5 due 10 pm **Friday**, May 6th

Homework 10 due 10 pm **Wednesday**, May 4th

Last Time

Hashing

- terminology
- designing a good hash function
- choosing table size

Today

Hashing

- choosing table size (from last time)
- expanding a hash table
- handling collisions

Java Support for Hashing

Tree Map vs. Hash Map

Next Time

Read: continue *Sorting*

Sorting Intro

Basic Sorts

- bubble sort
- insertion sort
- selection sort

Better Sorts

- heap sort
- merge sort

Resizing the Hash Table

Naïve Expand

30		17	88	

Rehashing

1.

2.

Complexity

Collision Handling using Open Addressing

Open Addressing

Linear Probing

166
359
263

440		266	124	246			337			351

Collision Handling using Open Addressing

Quadratic Probing

166
359
263

440		266	124	246			337			351

Double Hashing

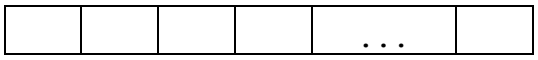
probe sequences assuming H_k is index 0:

Step size	Table size 10	Table size 11
2		
5		

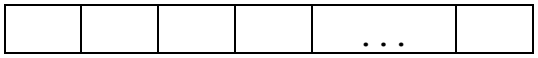
Collision Handling using Buckets

Buckets

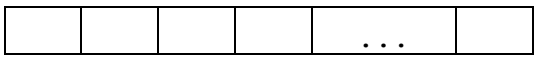
Array Buckets



"Chained" Buckets



Tree Buckets



Java API Support for Hashing

`hashCode` method

- method of Object class
- returns an int
- default hash code is BAD - computed from object's memory address

Guidelines for overriding `hashCode`:

`Hashtable<K,V>` and `HashMap<K,V>` class

- in java.util package
- implement `Map<K,V>` interface
  `K`
  `V`
  operations:

- constructors allow you to set
  initial capacity (default = 16 for HashMap, 11 for HashTable)
  load factor (default = 0.75)
- handles collisions with chained buckets
- HashMap only:
- Hashtable only:

TreeMap vs HashMap

	TreeMap	HashMap