CS 112 - Fall 2012, Lab 02

Haohan Zhu
Sorting Algorithm

- Selection Sort
- Insertion Sort
- Merge Sort
- Quick Sort

- Sorting algorithm from the lectures
## Sorting Algorithm

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Best</th>
<th>Average</th>
<th>Worst</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection sort</td>
<td>$n^2$</td>
<td>$n^2$</td>
<td>$n^2$</td>
<td>1</td>
</tr>
<tr>
<td>Insertion sort</td>
<td>$n$</td>
<td>$n^2$</td>
<td>$n^2$</td>
<td>1</td>
</tr>
<tr>
<td>Merge sort</td>
<td>$n\log n$</td>
<td>$n\log n$</td>
<td>$n\log n$</td>
<td>$n$</td>
</tr>
<tr>
<td>Quick sort</td>
<td>$n\log n$</td>
<td>$n\log n$</td>
<td>$n^2$</td>
<td>$\log n$</td>
</tr>
</tbody>
</table>
Sorting Algorithm

- Shell sort
- Heapsort

- Sorting algorithm from the textbook
Sorting Algorithm

- Bubble sort
- Cocktail sort
- Timsort (Java)
- ...

- Other sorting algorithms
### Sorting Algorithm

- **Sorting algorithms on Wikipedia**
- **Popular algorithms but not a full list**

<table>
<thead>
<tr>
<th>Name</th>
<th>Best</th>
<th>Average</th>
<th>Worst</th>
<th>Stable</th>
<th>Method</th>
<th>Other notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary tree</td>
<td>$n$</td>
<td>$n \log n$</td>
<td>$n \log n$</td>
<td>Yes</td>
<td>Insertion</td>
<td>When using a self-balancing binary search tree</td>
</tr>
<tr>
<td>Insertion</td>
<td>$n \log n$</td>
<td>$n \log n$</td>
<td>$n \log n$</td>
<td>No</td>
<td>Selection</td>
<td>Stable in-place, but unstable</td>
</tr>
</tbody>
</table>
Sorting Algorithm in Java

- **Class Collections**
  - sort(List<T> list)
  - sort(List<T> list, Comparator<? super T> c)

- **Class Arrays**
  - sort() for Primitive Types and Objects

- **PriorityQueue**
Practice

- Implementing Bubble Sort
- Compare two adjacent elements and sort them

7 1 5 3 8 4 6 2
1 7 5 3 8 4 6 2
1 5 7 3 8 4 6 2
Practice

- Bubble Sort or Cocktail Sort
- Different directions

7 1 5 3 8 4 6 2

1 7 5 3 8 4 6 2

1 5 7 3 8 4 6 2