#28: Heaps and Priority Queues
October 27, 2021 · G Carl Evans

A New Data Structure Arrives:

**ADT:**
- insert
- remove
- isEmpty

## Implementation of ____________

<table>
<thead>
<tr>
<th>insert</th>
<th>removeMin</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>O(n)</td>
<td>O(n)</td>
<td>Unsorted Array</td>
</tr>
<tr>
<td>O(1)</td>
<td>O(n)</td>
<td>Unsorted List</td>
</tr>
<tr>
<td>O(lg(n))</td>
<td>O(1)</td>
<td>Sorted Array</td>
</tr>
<tr>
<td>O(lg(n))</td>
<td>O(1)</td>
<td>Sorted List</td>
</tr>
</tbody>
</table>

**Q1:** What errors exist in this table? (Fix them!)

**Q2:** Which algorithm would we use?

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### Implementing a (min)Heap as an Array

![Heap Diagram](image)

**Operations:**
- leftChild(index) :=
- rightChild(index) :=
- parent(index) :=

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### Inserting into a Heap

![Heap Diagram](image)

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...running time?
Heap Operation: removeMin / heapifyDown:

What’s wrong with this code?

Q: How do we construct a heap given data?

CS 225 – Things To Be Doing:

1. Exam 2 ongoing
2. mp_mosaix due next Monday (Nov. 1)
3. lab_hash is out tomorrow, due on Sunday (Oct. 31)
4. Daily POTDs are ongoing :)