【DS】Day12

Tags	
Date	@June 5, 2022
Summary	Priority Queue API and Unordered Version Implementation

【Week 4】Priority Queue

4.1 APIs and Elementary Implementations

Priority queue: Remove the largest(or smallest) item.

API

```
public class MaxPQ<Key extends Comparable<Key>> {
  MaxPQ()
  MaxPQ(Key[] a)
  void insert(Key v)
  Key delMax()
  boolean isEmpty()
  Key max()
  int size()
}
```

Challenge: Find the largest M items in a stream of N items

```
MinPQ<Transaction> pq = new MinPQ<Transaction>();

while (StdIn.hasNextLine()) {
  String line = StdIn.readLine();
  Transaction item = new Transaction(line);
  pq.insert(item);
  if (pq.size() > M) // pq contains largest M items
    pq.delMin();
}
```

Priority queue: unordered array implementation

```
public class UnorderedMaxPQ<Key extends Comparable<Key>> {
  private Key[] pq;
  private int N;

  public UnorderedMaxPQ(int capacity) {
    pq = (Key[])new Comparable[capacity];
  }

  public boolean isEmpty() {
    return N == 0;
  }

  public void insert(Key k) {
    pq[N++] = k;
  }

  public Key delMax() {
    int max = 0;
    for (int i = 1; i < pq.length; ++i) {
      if (less(max, i)) max = i;
    }
    exch(max, N - 1);
    return pq[--N];
  }
}
```