

# Tölvunarfræði II

## Skiladæmi 8

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### Dæmi 1:

Gerum töflu yfir mögulegar staðsetningar, ef staðsetning kemur ekki fram er ekki hægt að setja stakið þangað:

$k = 2$	$k = 3$	$k = 4$
2	3	4
		5
		6
		7
	4	3
		5
		8
		9
	5	3
		4
		10
		11
3	2	4
		5
		6
		7
	6	2
		7
		12
		13
	7	2
		6
		14
		15

## Dæmi 2:

```
public class CubeSum implements Comparable<CubeSum>
{
    public int i;
    public int j;
    public int sum;

    public CubeSum(int ii, int jj)
    {
        i = ii;
        j = jj;
        sum = i*i*i + j*j*j;
    }

    public int compareTo(CubeSum cube)
    {
        if(this.sum > cube.sum) return 1;
        if(this.sum < cube.sum) return -1;
        else return 0;
    }

    public String toString()
    {
        return i + "^3 + " + j + "^3";
    }

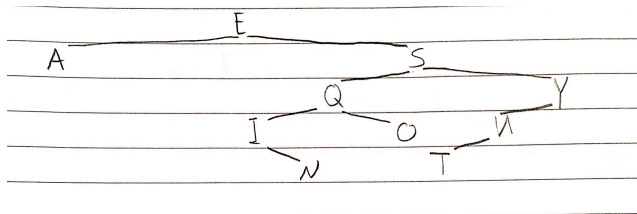
    public static void main(String[] args)
    {
        int N = Integer.parseInt(args[0]);
        MinPQ<CubeSum> pq = new MinPQ<CubeSum>(N);
        for(int i = 0; i < N + 1; i++)
        {
            CubeSum temp = new CubeSum(i, i);
            pq.insert(temp);
        }
        CubeSum prev = pq.delMin();
        if(prev.j < N) { pq.insert(new CubeSum(prev.i, prev.j + 1)); }
        while(!pq.isEmpty())
        {
            CubeSum temp = pq.delMin();
            if(temp.j < N) { pq.insert(new CubeSum(temp.i, temp.j + 1)); }
            if(temp.sum == prev.sum) { System.out.println(temp + " = " +
                prev); }
            prev = temp;
        }
    }
}
```

### Dæmi 3

```
public class FrequencyCounter
{
    public static void main(String[] args)
    {
        int N = Integer.parseInt(args[0]);
        int[] a = new int[N];
        int heild = 0;
        for(int j = 0; j < 100; j++)
        {
            for(int i = 0; i < N; i++)
            {
                a[i] = (int)(Math.random()*1000) + 1;
            }
            ST<Integer, Integer> st = new ST<Integer, Integer>();
            for(int i = 0; i < N; i++)
            {
                int curr = a[i];
                if (!st.contains(curr)) st.put(curr, 1);
                else st.put(curr, st.get(curr) + 1);
            }
            heild += st.size();
        }
        double medaltal = (double)(heild)/100.0;
        StdOut.println("Medaltal einstakra gilda: " + medaltal);
    }
}
```

```
> run FrequencyCounter 10
Medaltal einstakra gilda: 9.97
> run FrequencyCounter 100
Medaltal einstakra gilda: 95.58
> run FrequencyCounter 1000
Medaltal einstakra gilda: 634.61
> run FrequencyCounter 10000
Medaltal einstakra gilda: 999.94
> run FrequencyCounter 100000
Medaltal einstakra gilda: 1000.0
> run FrequencyCounter 1000000
Medaltal einstakra gilda: 1000.0
>
```

# Dæmi 4



Scanned with CamScanner

fj. samb.	
E	- 0
A	- 1
S	- 1
Y	- 2
Q	- 2
U	- 3
E	- 1
S	- 2
T	- 4
I	- 3
O	- 3
N	- 4

Scanned with CamScanner

### Dæmi 5

- a) Virkar.
- b) 4, 10, 8, 7, 5, 3. Virkar ekki þar sem við myndum ekki skoða 3 eftir að við höfum fundið 5.
- c) Virkar.
- d) 2, 7, 3, 8, 4, 5. Virkar ekki þar sem við förum í vinstra tré 7 þar sem  $5 < 7$  en svo kemur 8 sem gengur ekki þar sem  $8 > 7$ .
- e) Virkar.

## Dæmi 6

```
import java.util.Arrays;

public class TopFreq implements Comparable<TopFreq>
{
    public String word;
    public int count;

    public TopFreq(String w, int c)
    {
        word = w;
        count = c;
    }

    public int compareTo(TopFreq temp)
    {
        if(this.count > temp.count) return 1;
        if(this.count < temp.count) return -1;
        else return 0;
    }

    public static void main(String [] args)
    {
        int k = Integer.parseInt(args[0]);
        int N = Integer.parseInt(args[1]);
        Stopwatch s = new Stopwatch();
        In in = new In();
        String[] a = in.readAllStrings();
        MaxPQ<TopFreq> pq = new MaxPQ<TopFreq>();
        Arrays.sort(a);
        int counter = 1;
        for(int i = 1; i < a.length; i++)
        {
            if(a[i].equals(a[i-1])) counter++;
            else
            {
                if(a[i-1].length() < 6) {}
                else
                {
                    TopFreq temp = new TopFreq(a[i-1], counter);
                    pq.insert(temp);
                }
                counter = 1;
            }
        }
        for(int i = 0; i < N; i++)
        {
            TopFreq temp = pq.delMax();
            System.out.println(temp.word + " " + temp.count);
        }
        double elap = s.elapsedTime();
        System.out.println(elap + "sek");
    }
}
```

```
askja-dw367:Tolfr102 sessihers$ java TopFreq 6 10 < tale.txt
defarge 280
little 265
before 230
himself 219
looked 193
doctor 192
madame 191
father 160
through 160
manette 155
0.327sek
```

```

public class TopFreqST implements Comparable<TopFreqST>
{
    public String word;
    public int count;

    public TopFreqST(String w, int c)
    {
        word = w;
        count = c;
    }

    public int compareTo(TopFreqST temp)
    {
        if(this.count > temp.count) return 1;
        if(this.count < temp.count) return -1;
        else return 0;
    }

    public static void main(String[] args)
    {
        int k = Integer.parseInt(args[0]);
        int N = Integer.parseInt(args[1]);
        Stopwatch s = new Stopwatch();
        In in = new In();
        ST<String, Integer> st = new ST<String, Integer>();
        MaxPQ<TopFreqST> pq = new MaxPQ<TopFreqST>();
        while(!in.isEmpty())
        {
            String temp = in.readString();
            if(temp.length() < 6) {}
            else if(st.contains(temp))
            {
                int count = st.get(temp);
                count++;
                st.put(temp, count);
            }
            else
            {
                st.put(temp, 1);
            }
        }
        for(String curr : st.keys())
        {
            TopFreqST temp = new TopFreqST(curr, st.get(curr));
            pq.insert(temp);
        }
        for(int i = 0; i < N; i++)
        {
            TopFreqST temp = pq.delMax();
            System.out.println(temp.word + " " + temp.count);
        }
        double elap = s.elapsedTime();
        System.out.println(elap);
    }
}

```



```
askja-dw367:Tolfr102 sessihers$ java TopFreqST 6 10 < tale.txt
defarge 280
little 265
before 230
himself 219
looked 193
doctor 192
madame 191
father 160
through 160
manette 155
0.284
```