

Assignment 6
Stats Results / Write Up:
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*Information on stats provided by professor Dunne:

$$\begin{aligned}\text{Seeks} &: \# \text{ of Lookups} \\ \text{Avg seek length} &: \frac{\text{number of nodes traversed}}{\text{Seeks}} \\ \text{Avg LL length} &: \frac{\text{Sum (LL length)}}{\text{length(ht)}} \\ \text{hash load} &: \frac{\text{Non Null Heads}}{\text{length(ht)}} \\ \text{Bloom load} &: \frac{\# \text{ of } 1\text{'s}}{\text{length(bf)}}\end{aligned}$$

Default values $\text{BF} = 2^{20} = 1048576$

$\text{HT} = 10000$

```
despinapatronas@Despinas-MacBook-Pro ~/Asgn6 ./hatterspeak -s -f 1048576 -h 10000
^D
Seeks: 14565
Average Seek Length: 0.732853
Average Linked List Length: 1.455700
Hash Table Load: 76.710000%
Bloom Filter Load: 3.888206%%
```

Default values: bloom filter is operating at a low capacity < 5%

NOTE: Hash table is already operating at $\frac{3}{4}$ capacity

EFFECT OF CHANGING THE BLOOMFILTER SIZE

What happens when we **increase BF by 2x**?

Increasing Bloomfilter size decreases bloom filter load proportionally

Overall more efficient for load (also decrease seek length by $\frac{1}{2}$)

Doesn't affect the other values however..

```
despinapatronas@Despinas-MacBook-Pro ~/Asgn6 ./hatterspeak -s -f 2048576 -h 10000
^D
Seeks: 14565
Average Seek Length: 0.732853
Average Linked List Length: 1.455700
Hash Table Load: 76.710000%
Bloom Filter Load: 1.990202%%
despinapatronas@Despinas-MacBook-Pro ~/Asgn6
```

What is the minimum bloomfilter size to reach capacity? (with the HT being static)

min BF size \approx 40,000 for operating at 100% capacity for the amount of inserts

***note the other values are unaffected**

```
despinatronas@Despinas-MacBook-Pro ~/Asgn6 ./hatterspeak -s -f 40000 -h 10000
^D
Seeks: 14565
Average Seek Length: 0.732853
Average Linked List Length: 1.455700
Hash Table Load: 76.710000%
Bloom Filter Load: 101.927000%
```

EFFECT OF CHANGING THE HASHTABLE SIZE

What happens when increasing HT size by 2x?

Doubling the HT: **(increases efficiency all around!)**

Will ALSO decrease the:

average seek length required by $\frac{1}{2}$

average linked list lengths by $\frac{1}{2}$

```
Bloom Filter Load: 3.888206%
despinatronas@Despinas-MacBook-Pro ~/Asgn6 ./hatterspeak -s -f 1048576 -h 20000
^D
Seeks: 14565
Average Seek Length: 0.367594
Average Linked List Length: 0.727850
Hash Table Load: 51.770000%
Bloom Filter Load: 3.888206%
```

What is the minimum HT size?

To reach almost 100 % capacity, we would have to $\frac{1}{2}$ the hashtable amount

Note: this drastically affects :

average seek length (6x + increase)

average linked list length (3x + increase)

```
despinatronas@Despinas-MacBook-Pro ~/Asgn6 ./hatterspeak -s -f 1048576 -h 5000
^D
Seeks: 14565
Average Seek Length: 1.461449
Average Linked List Length: 2.911400
Hash Table Load: 94.840000%
Bloom Filter Load: 3.888206%
despinatronas@Despinas-MacBook-Pro ~/Asgn6
```

Conclusion

Based on this data:

Changing the size of either of the ADTS does not affect the load of the other ADT

Increasing Hashtable is more beneficial than the bloomfilter

Note: my statistics may not be standard / expected results