CS 121 **Programming Assignment #5**
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April 29, 2020 **Due:** May 6, 2020

1 Objective

Examine/explore the effect of the loading factor (λ) on a hash table.

2 Background

The loading factor (the ratio of items in the table to table size, λ = items/table size) has considerable impact on the usefulness of hash tables.

3 Activities

1. Examine/Study the sample code for the hash table (on the class web site, on the *Sample Programs* page).
2. Download two of the dictionary files (`dict8.txt` and `dict4.txt`) stored in one of the CS 112 directories:
   http://www2.cs.uidaho.edu/~bruceb/cs112/Prog/Dicts/index.html
3. Modify the code as necessary to store the contents of a dictionary in the hash table.
4. Instrument/Modify the code to display how many words are stored in each *bucket* (linked list associated with a hash table location).
5. Instrument/Modify the code to display the minimum and maximum number of values stored in the buckets.
6. Instrument/Modify the code to search for at least ten words in the hash table. How many probes are required?
7. Examine effects of the size of the hash table for the following values: 8017, 11037, and 49957.
   - Repeat steps 4–6.
   - How many (if any) empty buckets are there.
8. Document any issues/problems as you find them.

4 Deliverables

1. Annotate a `script` session to demonstrate that your code works properly.
2. Your modified source code
3. Programming Log:
   - Record the time required to design and implement your program.
   - Record of things you encountered/learned while implementing your program.
4. Output—proof that your program worked.

5 References

The C Programming Language, Second edition, Brian Kernighan and Dennis Ritchie, Prentice-Hall, 1988

Sample Hash Table code:
http://www2.cs.uidaho.edu/~bruceb/cs121/Code/index.html