Comp 160: Algorithms, **Recitation 5**

This is a short recitation so that you can prepare for first exam.

1. The list of keys AMY, BOB, CAZ, DAN, EVA, FAN, GIA is to be stored in a hash table of size 9 using the simple hashing function $H(key) = k(key)\ mod\ 9$, where the mappings $k(key)$ are:

   $k(\text{AMY}) = 3$, $k(\text{BOB}) = 52$, $k(\text{CAZ}) = 45$, $k(\text{DAN}) = 28$, $k(\text{EVA}) = 43$, $k(\text{FAN}) = 57$, $k(\text{GIA}) = 69$

   Suppose that if $H(key) = h$, and slot h is occupied, we probe in succession slots $P(i) = (h + i \cdot C(key)) \bmod 9$, $i = 1, 2, ...$ where $C(key) = (k(key) \bmod 5) + 1$, until an unoccupied slot is found.

   (a) What is this hashing scheme called?

   (b) Sketch the resulting data structure after inserting the keys in alphabetical order (ie: insert AMY, then BOB, ...)

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0 _______        5 _______
1 _______        6 _______
2 _______        7 _______
3 _______        8 _______
4 _______
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   (c) What is the average number of key comparisons required to successfully retrieve a key in this table? Assume equal retrieval frequencies. Show the computation.

   (d) Say we now use hashing with chaining for collision resolution. That is, each table entry is the head pointer (possibly NIL) to a linked list of keys. Answer the previous two questions with this scheme instead

   (e) Go back to practice questions of previous weeks. Is there any question you would like to know the answer to?