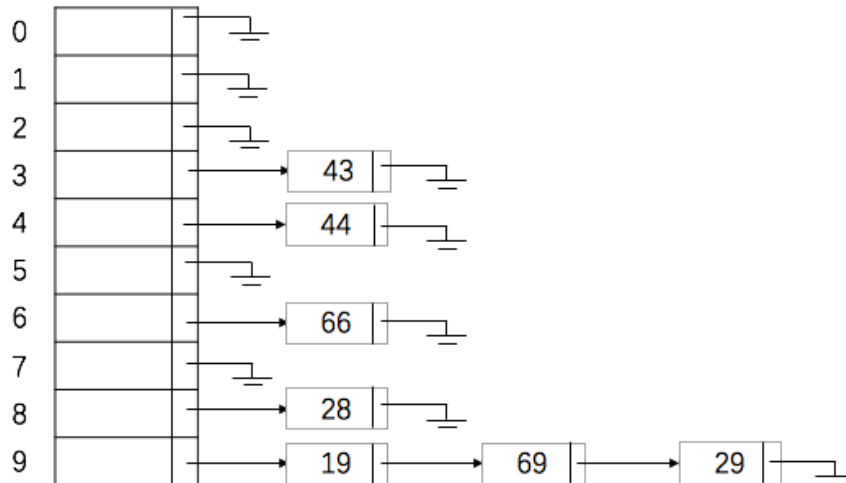


College of San Mateo
Data Abstraction and Algorithms
Assignment #3-A: Binary Trees and AVL Trees

Given input { 66, 28, 43, 29, 44, 69, 19 } and a hash function $h(x) = x \bmod 10$, show the resulting hash table:

1) Using Separate Chaining



2) Using Linear Probing

Insert 66 66%10=6	Insert 28 28%10=8	Insert 43 43%10=3	Insert 29 29%10=9	Insert 44 44%10=4	Insert 69 69%10=9	Insert 19 19%10=9
0	0	0	0	0	0	0
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

successful probes:

0000012

3) Using Quadratic Probing

Figure 1 illustrates the insertion of new elements into a B-tree. The figure shows seven B-tree diagrams, each with 10 slots (0-9). The diagrams illustrate the insertion of elements 66, 28, 43, 29, 44, 69, and 19 into a B-tree with a maximum of 10 slots per node. The diagrams show the state of the B-tree after each insertion, with the new element highlighted in red. The diagrams are labeled "Insert 66", "Insert 28", "Insert 43", "Insert 29", "Insert 44", "Insert 69", and "Insert 19".

4) Starting with the following hash function: $h_2(x) = 7 - (x \bmod 7)$,

input { 66, 28, 43, 29, 44, 69, 19 }

$h_2(x) = 7 - (x \bmod 7)$, $\lambda = 7 / 7 = 1$, because $\lambda > 0.5$. Rehash needed.

$2 \times 7 = 14$, the next prime is 17, $\lambda = 7 / 17 \approx 0.412$, $\lambda < 0.5$

$$h_2(x) = 7 - (x \bmod 17)$$

If $h_2(x) < 0$, $h_2(x) = h_2(x) + 17$

$$h_2(66) = 7 - (66 \bmod 17) = -8, \text{ which add } 17 = 9$$
$$h_2(28) = 7 - (28 \bmod 17) = -4, \text{ which add } 17 = 13$$
$$h_2(43) = 7 - (43 \bmod 17) = -2, \text{ which add } 17 = 15$$
$$h_2(29) = 7 - (29 \bmod 17) = -5, \text{ which add } 17 = 12$$
$$h_2(44) = 7 - (44 \bmod 17) = -3, \text{ which add } 17 = 14$$

$$h_2(69) = 7 - (69 \bmod 17) = 6$$

$$h_2(19) = 7 - (19 \bmod 17) = 5$$

0	
1	
2	
3	
4	
5	19
6	69
7	
8	
9	66
10	
11	
12	29
13	28
14	44
15	43
16	