Yucen Cao

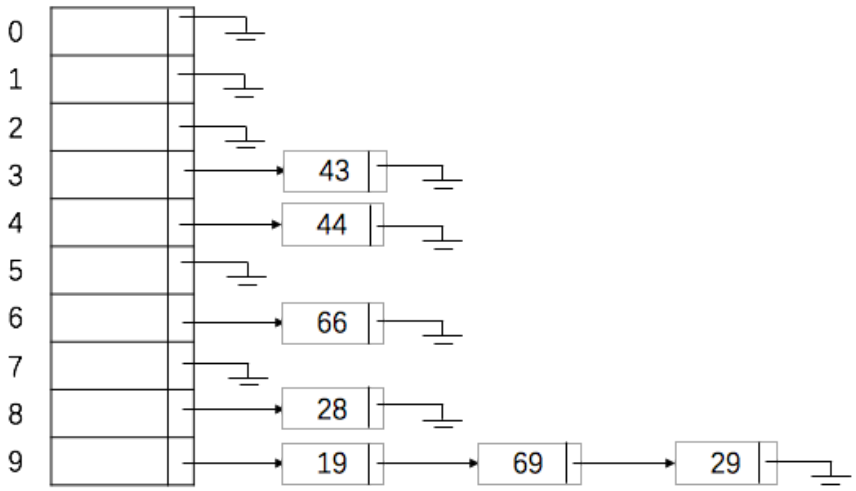
College of San Mateo

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 mod 10, show the resulting hash table:

1) Using Separate Chaining

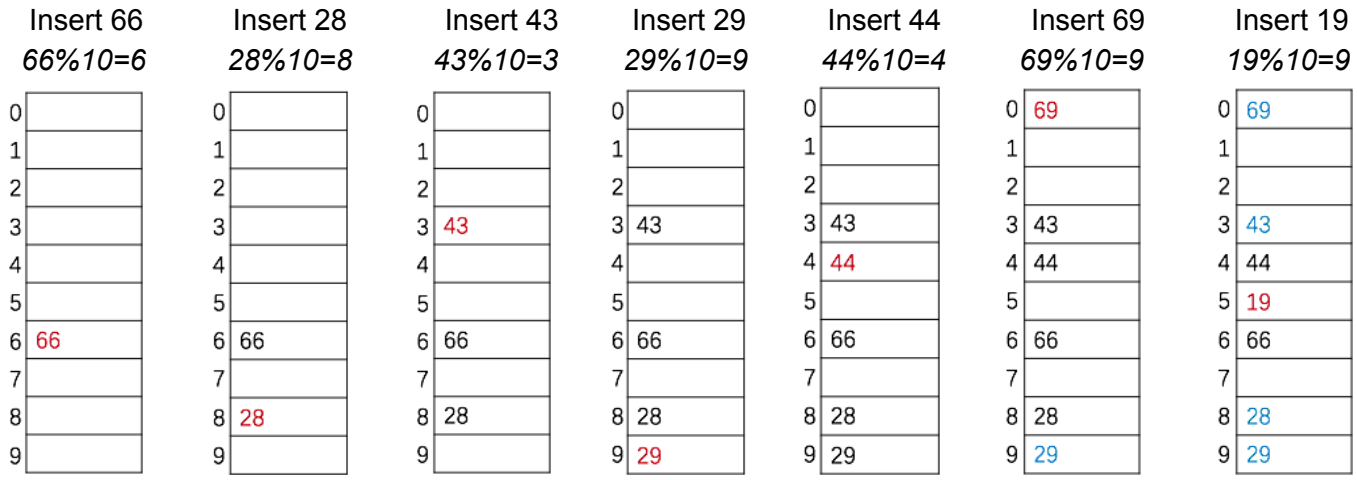


2) Using Linear Probing

	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						69	69
1							19
2							
3			43	43	43	43	43
4					44	44	44
5							
6	66	66	66	66	66	66	66
7							
8		28	28	28	28	28	28
9				29	29	29	29
#unsuccessful probes:	0	0	0	0	0	1	2

total: 3

3) Using Quadratic Probing



#unsuccessful probes:	0	0	0	0	0	1	4	total 5

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 $h_2(x) < 0$, $h_2(x) = h_2(x) + 17$
$h_2(66) = 7 - (66 \bmod 17) = -8$, which add 17 = 9
$h_2(28) = 7 - (28 \bmod 17) = -4$, which add 17 = 13
$h_2(43) = 7 - (43 \bmod 17) = -2$, which add 17 = 15
$h_2(29) = 7 - (29 \bmod 17) = -5$, which add 17 = 12
$h_2(44) = 7 - (44 \bmod 17) = -3$, 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	