

Linear Probing, hash function:  $h(k) = (3k + 4) \bmod 8$

41:  $h(41) = 7 \rightarrow$  index 7

30:  $h(30) = 6 \rightarrow$  index 6

74:  $h(74) = 2 \rightarrow$  index 2

55:  $h(55) = 1 \rightarrow$  index 1

68:  $h(68) = 0 \rightarrow$  index 0

39:  $h(39) = 1 \rightarrow$  occupied; +1 collision = 2 occupied; +1 collision = 3  $\rightarrow$  index 3

64:  $h(64) = 4 \rightarrow$  index 4

72:  $h(72) = 4 \rightarrow$  occupied; +1 collision = 5  $\rightarrow$  index 5

Index	Element
0	68
1	55
2	74
3	39
4	64
5	72
6	30
7	41

Quadratic Probing:  $h(k, i) = (h(k) + i^2) \bmod m$ ; hash function:  $h(k) = (3k) \bmod 8$

$h(19) = 1 \rightarrow$  index 1

$h(29) = 7 \rightarrow$  index 7

$h(16) = 0 \rightarrow$  index 0

$h(26) = 6 \rightarrow$  index 6

$h(14) = 2 \rightarrow$  index 2

$h(24) = 0$  occupied  $\rightarrow h(24,1) = 1$  occupie  $\rightarrow h(24,2) = 4 \rightarrow$  index 4

$h(13) = 7$  occupied  $\rightarrow h(13,1) = 0$  occupied  $\rightarrow h(13,2) = 3 \rightarrow$  index 3

$h(23) = 5 \rightarrow$  index 5

Index	Element
0	16
1	19
2	14

3	13
4	24
5	23
6	26
7	29

Double Hashing:  $h(k, i) = (h_1(k) + i * h_2(k)) \bmod m$ ; hash function =

$$h_1(k) = (k) \bmod 8, h_2(k) = ((5k + 3) \bmod 7) + 1$$

$h(22) = 6 \rightarrow$  index 6

$h(14) = 6$  occupied  $\rightarrow h(14, 1) = 2 \rightarrow$  index 2

$h(39) = 7 \rightarrow$  index 7

$h(23) = 7$  occupied  $\rightarrow h(23, 1) = 6$  occupied  $\rightarrow h(23, 2) = 5 \rightarrow$  index 5

$h(80) = 0 \rightarrow$  index 0

$h(53) = 5$  occupied  $h(53, 1) = 0$  occupied  $\rightarrow h(53, 2) = 3 \rightarrow$  index 3

$h(49) = 1 \rightarrow$  index 1

$h(50) = 2$  occupied  $\rightarrow h(50, 1) = 4 \rightarrow$  index 4

Index	Element
0	80
1	49
2	14
3	53
4	50
5	23
6	22
7	39

Cuckoo Hashing:  $h_1(k)$  for table 1,  $h_2(k)$  for table 2; hash function

$$h_1(k) = (3k + 1) \bmod 7, h_2(k) = (\text{floor}(5k / 2) + 3) \bmod 7$$

$h(9) = 0 \rightarrow$  index 0 T1

$h(23) = 0$  occupied  $\rightarrow h_2(9) = 4 \rightarrow 9$  goto index 4 T2

$h(24) = 3$

$h(15) = 4 \rightarrow$  index 4 T1

$h(87) = 3$  occupied  $\rightarrow h_2(24) = 0 \rightarrow 24$  goto index 0 T2

$h(20) = 5 \rightarrow$  index 5 T1

$h(12) = 2 \rightarrow$  index 2 T1

$h(47) = 2$  occupied  $\rightarrow h_2(12) = 5 \rightarrow 12$  goto index 5 T2

Index	T1	T2
0	23	24
1		
2	47	
3	87	
4	15	9
5	20	12
6		
7		