

PID: A16127732

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Linear Probing: $h(k, i) = (h(k) + i) \bmod m$	
Numbers to insert	[10, 41, 52, 25, 13, 77, 54, 70]
Table capacity	8
Hash function	$h(k) = (3k + 2) \bmod 8$
Quadratic Probing: $h(k, i) = (h(k) + i^2) \bmod m$	
Numbers to insert	[10, 41, 52, 25, 13, 42, 35, 92]
Table capacity	8
Hash function	$h(k) = (3k + 2) \bmod 8$
Double Hashing: $h(k, i) = (h_1(k) + i * h_2(k)) \bmod m$	
Numbers to insert	[22, 14, 39, 23, 80, 53, 49, 50]
Table capacity	8
Hash functions	$h_1(k) = (k) \bmod 8$, $h_2(k) = ((5k + 3) \bmod 7) + 1$
Cuckoo Hashing: $h_1(k)$ for table 1, $h_2(k)$ for table 2	
Numbers to insert	[9, 23, 24, 15, 87, 20, 12, 47]
Table capacity	14 (7 for each sub-table)
Hash functions	$h_1(k) = (3k + 1) \bmod 7$, $h_2(k) = (\text{floor}(5k / 2) + 3) \bmod 7$

Linear Probing, hash function: $h(k) = (3k+2) \bmod 8$.

Insert 10: $h(10) = 0 \rightarrow$ insert to index 0

Insert 41: $h(41) = 5 \rightarrow$ insert to index 5

Insert 52: $h(52) = 6 \rightarrow$ insert to index 6

Insert 25: $h(25) = 5$ (occupied), $+1$ (occupied), $+1 = 7 \rightarrow$ insert to index 7

Insert 13: $h(13) = 1 \rightarrow$ insert to index 1

Insert 77: $h(77) = 5$ (occupied), $+1$ (occupied), $+1$ (occupied), $\rightarrow 0$ (occupied), $+1$ (occupied), $+1 = 2 \rightarrow$ insert to index 2

Insert 54: $h(54) = 4 \rightarrow$ insert to index 4

Insert 70: $h(70) = 4$ (occupied), $+1$ (occupied), $+1$ (occupied), $+1$ (occupied), $\rightarrow 0$ (occupied), $+1$ (occupied), $+1$ (occupied), $+1 = 3 \rightarrow$ insert to index 3

Index	Element
0	10
1	13
2	77
3	70
4	54
5	41
6	52
7	25

Quadratic Probing, hash function: $h(k) = (3k+2) \bmod 8$.

Insert 10: $h(10) = 0 \rightarrow$ insert to index 0

Insert 41: $h(41) = 5 \rightarrow$ insert to index 5

Insert 52: $h(52) = 6 \rightarrow$ insert to index 6

Insert 25: $h(25) = 5$ (occupied), $+1$ (occupied), $+4 - 7 = 3 \rightarrow$ insert to index 3

Insert 13: $h(13) = 1 \rightarrow$ insert to index 1

Insert 42: $h(42) = 0$ (occupied), $+1$ (occupied), $+4$ (occupied), $+9 - 7 = 7 \rightarrow$ insert to index 7

Insert 35: $h(35) = 3$ (occupied), $+1 = 4 \rightarrow$ insert to index 4

Insert 92: $h(92) = 6$ (occupied), $+1$ (occupied), $+4 - 7$ (occupied), $+9 - 7$ (occupied), $+16 - 7 \cdot 2$ (occupied) $\rightarrow +25 - 7 \cdot 3$ (occupied) $\rightarrow +36 - 7 \cdot 5$ (occupied) $\rightarrow +49 - 7 \cdot 7$ (occupied), $+64 - 7 \cdot 9$ (occupied) $\rightarrow 81 - 7 \cdot 11$ (occupied) $\rightarrow 100 - 7 \cdot 14 = 2 \rightarrow$ insert to index 2

Index	Element
0	10
1	13
2	92
3	25
4	35

5	41
6	52
7	42

Double Hashing, hash function: $h_1(k) = (k) \bmod 8$, $h_2(k) = ((5k + 3) \bmod 7) + 1$

[22, 14, 39, 23, 80, 53, 49, 50]

Insert 22: $h(22,0) = h_1(22) = 6 \rightarrow$ insert to index 6

Insert 14: $h(14,0) = h_1(14) = 6$ (occupied), $h(14,1) = (6 + 4) \bmod 8 = 2 \rightarrow$ insert to index 2

Insert 39: $h(39,0) = h_1(39) = 7 \rightarrow$ insert to index 7

Insert 23: $h(23,0) = h_1(23) = 7$ (occupied), $h(23,1) = (7 + 7) \bmod 8 = 6$ (occupied), $h(23, 2) = (7+7*2) \bmod 8 = 5 \rightarrow$ insert to index 5

Insert 80: $h(80, 0) = h_1(80) = 0 \rightarrow$ insert to index 0

Insert 53: $h(53, 0) = h_1(53) = 5$ (occupied), $h(53,1) = (5+3) \bmod 8 = 0$ (occupied), $h(53, 2) = (5+2*3) \bmod 8 = 3 \rightarrow$ insert to index 3

Insert 49: $h(49, 0) = h_1(49) = 1 \rightarrow$ insert to index 1

Insert 50: $h(50, 0) = h_1(50) = 2$ (occupied), $h(50,1) = (2+7) \bmod 8 = 1$ (occupied), $h(50, 2) = (2+2*7) \bmod 8 = 0$ (occupied), $h(50, 3) = (2 + 3*7) \bmod 8 = 7$ (occupied), $h(50, 4) = (2+4*7) \bmod 8 = 6$ (occupied), $h(50, 5) = (2+5*7) \bmod 8 = 5$ (occupied), $h(50, 6) = (2+6*7) \bmod 8 = 4 \rightarrow$ insert to index 4

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

Cuckoo Hashing: hash function: $h_1(k) = (3k + 1) \bmod 7$, $h_2(k) = (\text{floor}(5k / 2) + 3) \bmod 7$, $h_1(k)$ for table 1, $h_2(k)$ for table 2

Insert 9: $h_1(9) = 0$ -> insert to index 0 of table 1

Insert 23: $h_1(23) = 0$ (occupied) -> insert to index 0 of table 1, insert 9 to table 2: $h_2(9) = 4$ -> insert to index 4 of table 2

Insert 24: $h_1(24) = 3$ -> insert to index 3 of table 1

Insert 15: $h_1(15) = 4$ -> insert to index 4 of table 1

Insert 87: $h_1(87) = 3$ (occupied) -> insert to index 3 of table 1, insert 24 to table 2:
 $h_2(24) = 0$ -> insert to index 0 of table 2

Insert 20: $h_1(20) = 5$ -> insert to index 5 of table 1

Insert 12: $h_1(12) = 2$ -> insert to index 2 of table 1

Insert 47: $h_1(47) = 2$ (occupied) -> insert to index 2 of table 1, insert 12 to table 2:
 $h_2(12) = 5$ -> insert to index 5 of table 1

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