

Ejercicio 10  $m = 11$   $h'(k) = k$

① Linear probing  $h(k, i) = (h'(k) + i) \bmod m$

0	22
1	88
2	
3	
4	4
5	15
6	28
7	17
8	59
9	31
10	10

$$\begin{aligned}
 10: h(10, 0) &= 10 \bmod 11 = 10 \\
 22: h(22, 0) &= 22 \bmod 11 = 0 \\
 31: h(31, 0) &= 31 \bmod 11 = 9 \\
 4: h(4, 0) &= 4 \bmod 11 = 4 \\
 15: h(15, 0) &= 15 \bmod 11 = 4 \\
 &\quad h(15, 1) = 16 \bmod 11 = 5 \\
 28: h(28, 0) &= 28 \bmod 11 = 6 \\
 17: h(17, 0) &= 17 \bmod 11 = 6 \\
 &\quad h(17, 1) = 18 \bmod 11 = 7 \\
 88: h(88, 0) &= 88 \bmod 11 = 0 \\
 &\quad h(88, 1) = 89 \bmod 11 = 1 \\
 59: h(59, 0) &= 59 \bmod 11 = 4 \\
 &\quad h(59, 1) = 60 \bmod 11 = 5 \\
 &\quad h(59, 2) = 61 \bmod 11 = 6 \\
 &\quad h(59, 3) = 62 \bmod 11 = 7 \\
 &\quad h(59, 4) = 63 \bmod 11 = 8
 \end{aligned}$$

② Quadratic probing  $c_1 = 1$  y  $c_2 = 3$

$$h(k, i) = (h'(k) + c_1 i + c_2 i^2) \bmod m$$

$$10: h(10, 0) = 10 \bmod 11 = 10$$

$$22: h(22, 0) = 22 \bmod 11 = 0$$

$$31: h(31, 0) = 31 \bmod 11 = 9$$

$$4: h(4, 0) = 4 \bmod 11 = 4$$

$$15: h(15, 0) = 15 \bmod 11 = 4$$

0	22
1	
2	88
3	17
4	4
5	
6	28
7	59
8	15
9	31
10	10

$$h(15,1) = (15+1+3) \bmod 11 = \\ = 19 \bmod 11 = 8$$

$$28: h(28,0) = 28 \bmod 11 = 6$$

$$17: h(17,0) = 17 \bmod 11 = 6$$

$$h(17,1) = (17+1+3) \bmod 11 = \\ = 21 \bmod 11 = 10$$

$$h(17,2) = (17+2+3(2)^2) \bmod 11 = \\ = (19+12) \bmod 11 =$$

$$= 31 \bmod 11 = 9$$

$$h(17,3) = (17+3+3(3)^2) \bmod 11 =$$

$$= (20+27) \bmod 11 = \\ = (47 \bmod 11) = 3$$

$$88: h(88,0) = 88 \bmod 11 = 0$$

$$h(88,1) = (88+1+3) \bmod 11 = 92 \bmod 11 = 4$$

$$h(88,2) = (88+2+12) \bmod 11 = 102 \bmod 11 = 3$$

$$h(88,3) = (88+3+27) \bmod 11 = 118 \bmod 11 = 8$$

$$h(88,4) = (88+4+48) \bmod 11 = 140 \bmod 11 = 8$$

$$h(88,5) = (88+5+75) \bmod 11 = 168 \bmod 11 = 3$$

$$h(88,6) = (88+6+108) \bmod 11 = 202 \bmod 11 = 4$$

$$h(88,7) = (88+7+147) \bmod 11 = 242 \bmod 11 = 0$$

$$h(88,8) = (88+8+192) \bmod 11 = 288 \bmod 11 = 2$$

$$59: h(59,0) = (59 \bmod 11) = 4$$

$$h(59,1) = (59+1+3) \bmod 11 = 63 \bmod 11 = 8$$

$$h(59,2) = (59+2+12) \bmod 11 = 73 \bmod 11 = 7$$

③ Double hashing  $h_1(k) = k$   $h_2(k) = 1 + (k \bmod (m-1))$

$$h(k, i) = (h_1(k) + i \cdot h_2(k)) \bmod m \quad 17$$

88

59

$$10: h(10, 0) = 10 \bmod 11 = 10$$

0	22
1	
2	59
3	17
4	4
5	15
6	28
7	88
8	
9	31
10	10

$$22: h(22, 0) = 22 \bmod 11 = 0$$

$$31: h(31, 0) = 31 \bmod 11 = 9$$

$$4: h(4, 0) = 4 \bmod 11 = 4$$

$$15: h(15, 0) = 15 \bmod 11 = 4$$

$$h(15, 1) = (15 + 6) \bmod 11 = 10$$

$$h(15, 2) = 15 + 12 \bmod 11 = 5$$

$$28: h(28, 0) = 28 \bmod 11 = 6$$

$$17: h(17, 0) = 17 \bmod 11 = 6$$

$$h(17, 1) = (17 + 8) \bmod 11 = 3$$

$$88: h(88, 0) = 88 \bmod 11 = 0$$

$$h(88, 1) = (88 + 9) \bmod 11 = 9$$

$$h(88, 2) = (88 + 18) \bmod 11 = 7$$

$$59: h(59, 0) = 59 \bmod 11 = 4$$

$$h(59, 1) = (59 + 10) \bmod 11 = 3$$

$$h(59, 2) = (59 + 20) \bmod 11 = 2$$

$$\begin{aligned} & i h_2(k) \\ & 1 (1 + (15 \bmod 10)) \\ & = 6 \\ & \underline{1 (h_2(15)) = 6} \\ & 2 (1 + (15 \bmod 10)) \\ & = 12 \\ & \underline{(1 + (17 \bmod 10))} \\ & 1 + 7 = 8 \\ & \underline{1 + (88 \bmod 10)} \\ & 1 + 8 = 9 \\ & \underline{2 (1 + (88 \bmod 10))} \\ & 2 \cdot 9 = 18 \\ & \underline{1 + (59 \bmod 10)} \\ & 1 + 9 = 10 \end{aligned}$$

Ejercicio 12 -  $m = 10; h'(k) = k \bmod 10$

12, 18, 13, 2, 3, 23, 5, 15

Linear probing:  $h(k, i) = (h'(k) + i) \bmod m$

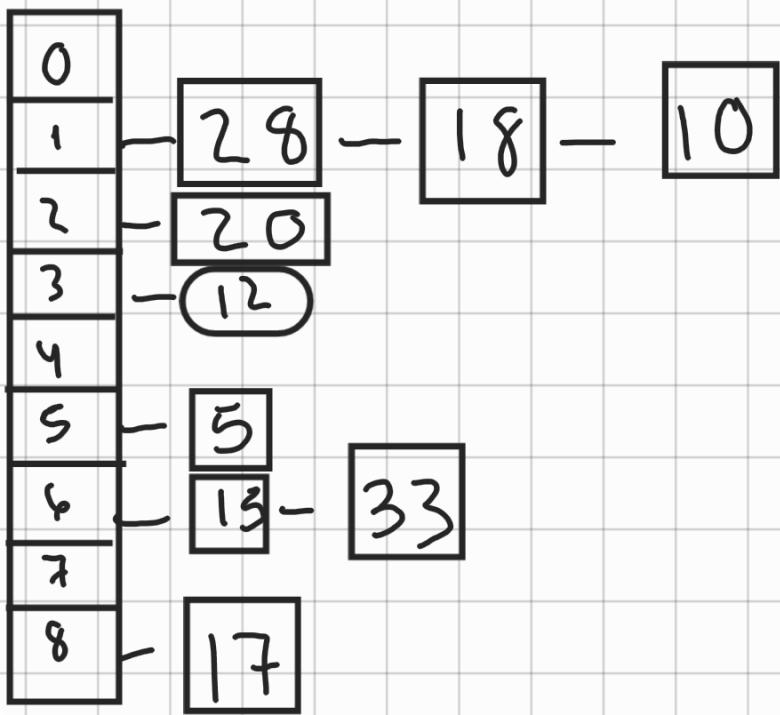
0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

12:  $h(12, 0) = 2 \bmod 10 = 2$  L2  
 18:  $h(18, 0) = 8 \bmod 10 = 8$  tabla  
 13:  $h(13, 0) = 3 \bmod 10 = 3$  correcto c)  
 2:  $h(2, 0) = 2 \bmod 10 = 2$  L2 (c)  
 $h(2, 1) = 3 \bmod 10 = 3$   
 $h(2, 2) = 4 \bmod 10 = 4$   
 3:  $h(3, 0) = 3 \bmod 10 = 3$   
 $h(3, 1) = 4 \bmod 10 = 4$   
 $h(3, 2) = 5 \bmod 10 = 5$   
 23:  $h(23, 0) = 3 \bmod 10 = 3$   
 $h(23, 1) = 4 \bmod 10 = 4$   
 $h(23, 2) = 5 \bmod 10 = 5$   
 $h(23, 3) = 6 \bmod 10 = 6$   
 5:  $h(5, 0) = 5 \bmod 10 = 5$   
 $h(5, 1) = 6 \bmod 10 = 6$   
 $h(5, 2) = 7 \bmod 10 = 7$   
 15:  $h(15, 0) = 5 \bmod 10 = 5$   
 $h(15, 1) = 6 \bmod 10 = 6$   
 $h(15, 2) = 7 \bmod 10 = 7$   
 $h(15, 3) = 8 \bmod 10 = 8$   
 $h(15, 4) = 9 \bmod 10 = 9$

### Ejercicio 1

Ejemplificar que pasa cuando insertamos las llaves 5, 28, 19, 15, 20, 33, 12, 17, 10 en un **HashTable** con la colisión resulta por el método de chaining. Permite que la tabla tenga 9 slots y la función de hash:

$$H(k) = k \bmod 9 \quad (1)$$



0
1
2
3
4
5
6
7
8
9

Ejercicio 13

$$h'(k) = k \bmod 10 \quad m=10$$

Linear Probing:  $h(k_i) = (h'(k) + i) \bmod m$

⑥ 46, 34, 42, 23, 52, 33

$$\underline{h(46, 0) = 6 \bmod 10 = 6}$$

$$\underline{h(34, 0) = 4 \bmod 10 = 4}$$

$$\underline{h(42, 0) = 2 \bmod 10 = 2}$$

$$\underline{h(23, 0) = 3 \bmod 10 = 3}$$

$$h(52, 0) = 2 \bmod 10 = 2$$

$$h(52, 1) = 3 \bmod 10 = 3$$

$$h(52, 2) = 4 \bmod 10 = 4$$

$$h(52, 3) = 5 \bmod 10 = 5$$

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$$h(33, 0) = 3 \bmod 10 = 3$$

$$h(33, 1) = 4 \bmod 10 = 4$$

$$h(33, 2) = 5 \bmod 10 = 5$$

$$h(33, 3) = 6 \bmod 10 = 6$$

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$$h(33, 4) = 7 \bmod 10 = 7$$