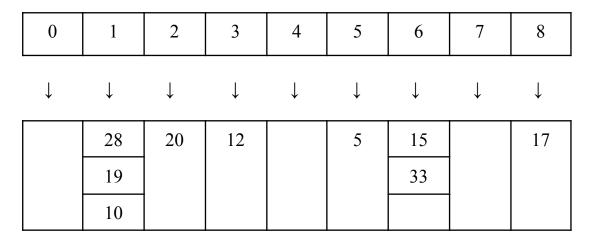Renzo Davila

Trabajo Práctico: Hash Tables

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. Permita que la tabla tenga 9 slots y la función de hash:

H (k) = k mod 9

Suponiendo que key = value

0	1	2	3	4	5	6	7	8
↓	↓	↓	↓	↓	↓	↓	↓	↓
	28	20	12		5	15		17
	19					33		
	10							

Parte 2:

3. Método de la multiplicación:

consideramos [x] la parte entera de x

$h(k) = [m(kA-[kA])]$

$h(k) = [1000 * (k * ((\sqrt{5}-1) / 2) - [k * ((\sqrt{5}-1) / 2)])]$

$h(61) = [1000 * (61 * ((\sqrt{5}-1) / 2) - [61 * ((\sqrt{5}-1) / 2)])] = $ **700**

$h(62) = [1000 * (62 * ((\sqrt{5}-1) / 2) - [62 * ((\sqrt{5}-1) / 2)])] = $ **318**

$h(63) = [1000 * (63 * ((\sqrt{5}-1) / 2) - [63 * ((\sqrt{5}-1) / 2)])] = $ **936**

$h(64) = [1000 * (64 * ((\sqrt{5}-1) / 2) - [64 * ((\sqrt{5}-1) / 2)])] = $ **554**

$h(65) = [1000 * (65 * ((\sqrt{5}-1) / 2) - [65 * ((\sqrt{5}-1) / 2)])] = $ **172**

4. La solución propuesta tiene un orden de O(n) + O(m) en el peor de los casos, siendo n y m la longitud de las palabras de entrada

5. La solución propuesta tiene un orden de O(n) siendo N la longitud de la lista de entrada.

8. La solución propuesta es menor al orden (N*K) ya que por cada carácter de la string más larga, no realiza k operaciones, si no, una sola la cual es compararlo con el primer carácter del patrón. A ese uno se le pueden sumar más operaciones, pero solo llegará a k operaciones cuando haya encontrado la palabra, y esto lo hará mucho menos que N veces

9. La solución propuesta sera de O(T) + O(S) ya que recorre una vez ambos conjuntos

Parte 3:

10.

m = 11

$h'(k) = k$

1. $h(k,i) = (h'(k) + i) \mod 11$

$h(10, 0) = (h'(10) + 0) \mod 11 = 10 \mod 11 = \mathbf{10}$

$h(22, 0) = (h'(22) + 0) \mod 11 = 22 \mod 11 = \mathbf{0}$

$h(31, 0) = (h'(31) + 0) \mod 11 = 31 \mod 11 = \mathbf{9}$

$h(4, 0) = (h'(4) + 0) \mod 11 = 4 \mod 11 = \mathbf{4}$

$h(15, 0) = (h'(15) + 0) \mod 11 = 15 \mod 11 = 4$
$h(15, 1) = (h'(15) + 1) \mod 11 = 16 \mod 11 = \mathbf{5}$

$h(28, 0) = (h'(28) + 0) \mod 11 = 28 \mod 11 = \mathbf{6}$

$h(17, 0) = (h'(17) + 0) \mod 11 = 17 \mod 11 = 6$
$h(17, 1) = (h'(17) + 1) \mod 11 = 18 \mod 11 = \mathbf{7}$

$h(88, 0) = (h'(88) + 0) \mod 11 = 88 \mod 11 = 0$
$h(88, 1) = (h'(88) + 1) \mod 11 = 89 \mod 11 = 1$

$h(59, 0) = (h'(59) + 0) \mod 11 = 59 \mod 11 = 4$
$h(59, 1) = (h'(59) + 1) \mod 11 = 60 \mod 11 = 5$
$h(59, 2) = (h'(59) + 2) \mod 11 = 61 \mod 11 = 6$
$h(59, 3) = (h'(59) + 3) \mod 11 = 62 \mod 11 = 7$
$h(59, 4) = (h'(59) + 4) \mod 11 = 63 \mod 11 = 8$

22	88			4	15	28	17	59	31	10

2. $h(k, i) = (h'(k) + 1*i + 3*i^2)$ mod 11

$h(10, 0) = (h'(10) + 1*0 + 3*0^2)$ mod 11 = 10 mod 11 = **10**

$h(22, 0) = (h'(22) + 1*0 + 3*0^2)$ mod 11 = 22 mod 11 = **0**

$h(31, 0) = (h'(31) + 1*0 + 3*0^2)$ mod 11 = 31 mod 11 = **9**

$h(4, 0) = (h'(4) + 1*0 + 3*0^2)$ mod 11 = 4 mod 11 = **4**

$h(15, 0) = (h'(15) + 1*0 + 3*0^2)$ mod 11 = 15 mod 11 = 4
$h(15, 1) = (h'(15) + 1*1 + 3*1^2)$ mod 11 = 19 mod 11 = **8**

$h(28, 0) = (h'(28) + 1*0 + 3*0^2)$ mod 11 = 28 mod 11 = **6**

$h(17, 0) = (h'(17) + 1*0 + 3*0^2)$ mod 11 = 17 mod 11 = 6
$h(17, 1) = (h'(17) + 1*1 + 3*1^2)$ mod 11 = 21 mod 11 = 10
$h(17, 2) = (h'(17) + 1*2 + 3*2^2)$ mod 11 = 31 mod 11 = 9
$h(17, 3) = (h'(17) + 1*3 + 3*3^2)$ mod 11 = 47 mod 11 = **3**

$h(88, 0) = (h'(88) + 1*0 + 3*0^2)$ mod 11 = 88 mod 11 = 0
$h(88, 1) = (h'(88) + 1*1 + 3*1^2)$ mod 11 = 92 mod 11 = 4
$h(88, 2) = (h'(88) + 1*2 + 3*2^2)$ mod 11 = 102 mod 11 = 3
$h(88, 3) = (h'(88) + 1*3 + 3*3^2)$ mod 11 = 118 mod 11 = 8
$h(88, 4) = (h'(88) + 1*4 + 3*4^2)$ mod 11 = 140 mod 11 = 8
$h(88, 5) = (h'(88) + 1*5 + 3*5^2)$ mod 11 = 168 mod 11 = 3
$h(88, 6) = (h'(88) + 1*6 + 3*6^2)$ mod 11 = 202 mod 11 = 4
$h(88, 7) = (h'(88) + 1*7 + 3*7^2)$ mod 11 = 242 mod 11 = 0
$h(88, 8) = (h'(88) + 1*8 + 3*8^2)$ mod 11 = 288 mod 11 = **2**

$h(59, 0) = (h'(59) + 1*0 + 3*0^2)$ mod 11 = 59 mod 11 = 4
$h(59, 1) = (h'(59) + 1*1 + 3*1^2)$ mod 11 = 63 mod 11 = 8
$h(59, 2) = (h'(59) + 1*2 + 3*2^2)$ mod 11 = 73 mod 11 = **7**

22		88	17	15		28	59	15	31	10

3. $h(k, i) = [k + i*(1 + (k$ mod $10))]$ mod 11 10; 22; 31; 4; 15; 28; 17; 88; 59

$h(10, 0) = [10 + 0*(1 + (10$ mod $10))]$ mod 11 = 10 mod 11 = **10**

$h(22, 0) = [22 + 0*(1 + (22$ mod $10))]$ mod 11 = 22 mod 11 = **0**

h(31, 0) = [31 + 0*(1 + (31 mod 10))] mod 11 = 31 mod 11 = **9**

h(4, 0) = [4 + 0*(1 + (4 mod 10))] mod 11 = 4 mod 11 = **4**

h(15, 0) = [15 + 0*(1 + (15 mod 10))] mod 11 = 15 mod 11 = 4
h(15, 1) = [15 + 1*(1 + (15 mod 10))] mod 11 = 21 mod 11 = 10
h(15, 2) = [15 + 2*(1 + (15 mod 10))] mod 11 = 27 mod 11 = **5**

h(28, 0) = [28 + 0*(1 + (28 mod 10))] mod 11 = 28 mod 11 = **6**

h(17, 0) = [17 + 0*(1 + (17 mod 10))] mod 11 = 17 mod 11 = 6
h(17, 0) = [17 + 1*(1 + (17 mod 10))] mod 11 = 25 mod 11 = **3**

h(88, 0) = [88 + 0*(1 + (88 mod 10))] mod 11 = 88 mod 11 = 0
h(88, 1) = [88 + 1*(1 + (88 mod 10))] mod 11 = 97 mod 11 = **2**

h(59, 0) = [59 + 0*(1 + (59 mod 10))] mod 11 = 59 mod 11 = 4
h(59, 1) = [59 + 1*(1 + (59 mod 10))] mod 11 = 69 mod 11 = 3
h(59, 2) = [59 + 2*(1 + (59 mod 10))] mod 11 = 79 mod 11 = 2
h(59, 3) = [59 + 3*(1 + (59 mod 10))] mod 11 = 89 mod 11 = 1

22	1	88	17	4	15	28			31	10

11. h(k, i) = [(k mod 10) + i] mod 10

h(12, 0) = [(12 mod 10) + 0] mod 11 = 2 mod 11 = 2

h(18, 0) = [(18 mod 10) + 0] mod 11 = 8 mod 11 = 8

h(13, 0) = [(13 mod 10) + 0] mod 11 = 3 mod 11 = 3

h(2, 0) = [(2 mod 10) + 0] mod 11 = 2 mod 11 = 2
h(2, 1) = [(2 mod 10) + 1] mod 11 = 3 mod 11 = 3
h(2, 2) = [(2 mod 10) + 2] mod 11 = 4 mod 11 = 4

A esta altura ya podemos ver que es la opción C

12.

		42	23	34	52	46	33		

h(k, i) = [(k mod 10) + i] mod 10

Opción A:
h(46, 0) = [(46 mod 10) + 0] mod 10 = 6 mod 10 = 6

h(42, 0) = [(42 mod 10) + 0] mod 10 = 2 mod 10 = 2
h(34, 0) = [(34 mod 10) + 0] mod 10 = 4 mod 10 = 4
h(52, 0) = [(52 mod 10) + 0] mod 10 = 2 mod 10 = 2
h(52, 1) = [(52 mod 10) + 1] mod 10 = 3 mod 10 = 3

A esta altura descartamos a la opción A ya que h(52, 1) no coincide

Opción B:
h(34, 0) = [(34 mod 10) + 0] mod 10 = 4
h(42, 0) = [(42 mod 10) + 0] mod 10 = 2
h(23, 0) = [(23 mod 10) + 0] mod 10 = 3 mod 10 = 3

h(52, 0) = [(52 mod 10) + 0] mod 10 = 2
h(52, 1) = [(52 mod 10) + 1] mod 10 = 3
h(52, 2) = [(52 mod 10) + 2] mod 10 = 4 mod 10 = 4
h(52, 3) = [(52 mod 10) + 3] mod 10 = 5 mod 10 = 5

h(33, 0) = [(33 mod 10) + 0] mod 10 = 3 mod 10 = 3
h(33, 1) = [(33 mod 10) + 1] mod 10 = 4 mod 10 = 4
h(33, 2) = [(33 mod 10) + 2] mod 10 = 5 mod 10 = 5
h(33, 3) = [(33 mod 10) + 3] mod 10 = 6 mod 10 = 6

A esta altura descartamos a la opción A ya que h(33, 3) no coincide

Opción C:
h(46, 0) = [(46 mod 10) + 0] mod 10 = 6
h(34, 0) = [(34 mod 10) + 0] mod 10 = 4
h(42, 0) = [(42 mod 10) + 0] mod 10 = 2
h(23, 0) = [(23 mod 10) + 0] mod 10 = 3

h(52, 0) = [(52 mod 10) + 0] mod 10 = 2
h(52, 1) = [(52 mod 10) + 1] mod 10 = 3
h(52, 2) = [(52 mod 10) + 2] mod 10 = 4
h(52, 3) = [(52 mod 10) + 3] mod 10 = 5

h(33, 0) = [(33 mod 10) + 0] mod 10 = 3 mod 10 = 3
h(33, 1) = [(33 mod 10) + 1] mod 10 = 4 mod 10 = 4
h(33, 2) = [(33 mod 10) + 2] mod 10 = 5 mod 10 = 5
h(33, 3) = [(33 mod 10) + 3] mod 10 = 6 mod 10 = 6
h(33, 4) = [(33 mod 10) + 4] mod 10 = 7 mod 10 = 7

La opción C coincide, por lo que es correcto!!