**Assignment** 11

R-2.19 Draw the 11-item hash table resulting from hashing the keys 12, 44, 13, 88, 23, 94, 11, 39, 20, 16, and 5, using the hash function h(i) = (2i + 5) mod 11 and assuming collisions are handled by chaining.

**Solution**

Let we calculate hush first

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Key | 12 | 44 | 13 | 88 | 23 | 94 | 11 | 39 | 20 | 16 | 5 |
| 2\*key+5 | 29 | 93 | 31 | 181 | 51 | 193 | 27 | 83 | 45 | 37 | 15 |
| (2\*key+5)mod 11 | 7 | 0 | 2 | 0 | 1 | 6 | 0 | 6 | 9 | 5 | 5 |
| Secondary hush  h(k)=7-(k MOD d) | 2 | 5 | 1 | 3 | 5 | 4 | 3 | 3 | 1 | 5 | 2 |

So the hush Table is

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 44,88,11 | 23 | 13 |  |  | 16,5 | 94,39 | 12 |  | 20 | 5 |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

R-2.20 What is the result of the previous exercise, assuming collisions are handled by linear probing?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 44 | 88 | 13 | 23 | 11 | 16 | 94 | 12 | 39 | 20 | 5 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

R-2.21 Show the result of Exercise R-2.19, assuming collisions are handled by quadratic probing, up to the point where the method fails because no empty slot is found.

R-2.22 What is the result of Exercise R-2.19 assuming collisions are handled by double hashing using a secondary hash function h’(k) = 7 – (k mod 7)?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 44 | 23 | 13 | 88 | 39 | 16 | 94 | 12 | 20 | 11 | 5 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Give the pseudo-code description for performing a removal from a hash table that uses linear probing to resolve collisions. Why is it necessary to use a special marker to represent deleted elements?