

Data Structures and its Applications

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Double Hashing

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- Double hashing is collision resolving technique in open addressed hash tables.
- Double hashing uses the idea of applying a second hash function to key when a collision occurs.

Let **h1(key)** = key mod 13 be hash function1.

Let $h2(key) = 7 - key \mod 7$ be hash function2.

Consider the following elements to be inserted into the hash table of size TABLESIZE.

Keys: { 18, 41, 22, 44 }.

Let's now calculate the values of h1(key) and h2(key).

Key	h1(key)	h2(key)
18	18 mod 13 = 5	7-(18 mod 7) = 3
41	41 mod 13 = 2	7-(41 mod 7) = 1
22	22 mod 13 = 9	7-(22 mod 7) = 6
44	44 mod 13 = 5	7-(44 mod 7) = 2

Кеу	h1(key)	h2(key)	Double hash(key)
18	18 mod 13 = 5	7-(18 mod 7) = 3	-
41	41 mod 13 = 2	7-(41 mod 7) = 1	-
22	22 mod 13 = 9	7-(22 mod 7) = 6	-
44	44 mod 13 = 5	7-(44 mod 7) = 2	-

Index	0	1	2	3	4	5	6	7	8	9	10	11	12
Key			41			18				22			

- Key 18, using h1(key) gives 5 as index / hash. Go to location 5. It is Free. Assign 18 to location 5.
- Key 41, using h1(key) gives 2 as index / hash. Go to location 2. It is Free. Assign 41 to location 2.
- Key 22, using h1(key) gives 2 as index / hash. Go to location 2. It is Free. Assign 22 to location 9.
- Key 44, using h1(key) gives 5 as index / hash. Go to location 5. It is not Free.

Use double hashing function.



Key	h1(key)	h2(key)	Double hash(key)
18	18 mod 13 = 5	7-(18 mod 7) = 3	-
41	41 mod 13 = 2	7-(41 mod 7) = 1	-
22	22 mod 13 = 9	7-(22 mod 7) = 6	-
44	44 mod 13 = 5	7-(44 mod 7) = 5	-



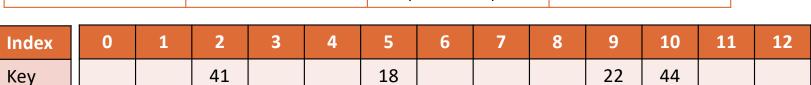
Index	0	1	2	3	4	5	6	7	8	9	10	11	12
Key			41			18				22			

• Key – 44, using h1(key) gives 5 as index / hash. Go to location 5. It is not Free.

Use double hashing function. Index/hash = hash1(key) + j * hash2(key), j=1 as it has the first collision.

. Index/hash =(5 + 1 * (5)) % 13 = 10

Key	h1(key)	h2(key)	Double hash(key)
18	18 mod 13 = 5	7-(18 mod 7) = 3	-
41	41 mod 13 = 2	7-(41 mod 7) = 1	-
22	22 mod 13 = 9	7-(22 mod 7) = 6	-
44	44 mod 13 = 5	7-(44 mod 7) = 5	10



• Key – 44, using h1(key) gives 5 as index / hash. Go to location 5. It is not Free.

Use double hashing function. Index/hash = hash1(key) + j * hash2(key), j=1 as it has the first collision.

Index/hash = (5 + 1 * (5)) % 13 = 10.

Since location 10 is free, key value 44 is stored in location 10.

The collision is resolved using double hashing.





THANK YOU

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