Header and Macro

The code includes the stdio.h header file, which provides input/output functions such as printf.

The M macro is defined as 11, which represents the size of the hash table.

Hash Function h1

The h1 function takes an integer key as input and returns a hash value between 0 and M-1.

The function uses a quadratic polynomial to calculate the hash value:

Adds 7 to the key value and squares the result.

Divides the result by 16.

Adds the original key value to the result.

Takes the modulus of the result with M to ensure the hash value falls within the range of the hash table.

Insert Function insert

The insert function takes a hash_table array and a key value as input.

It calculates the home slot for the key using the h1 hash function.

If the home slot is already occupied, the function uses linear probing to find an empty slot:

Initializes a probe slot to the home slot.

If the probe slot is occupied, increments the probe slot by 1 and takes the modulus with M to wrap around the hash table.

Repeats the previous step until an empty slot is found.

Once an empty slot is found, the key is inserted into the hash table.

The function also prints the probe sequence to the console.

Print Hash Table Function print_hash_table

The print_hash_table function takes a hash_table array as input.

It prints the final contents of the hash table to the console:

Prints the header "Final Hash Table:".

Prints the slot numbers from 0 to M-1.

Prints the corresponding key values in the hash table.

Main Function

The main function initializes an empty hash table with M slots, each initialized to -1 to indicate an empty slot.

It defines an array of keys to be inserted into the hash table.

The function uses a loop to insert each key into the hash table using the insert function.

Finally, the function calls the print_hash_table function to display the final contents of the hash table.

Key Points

The code implements a simple hash table with linear probing to resolve collisions.

The h1 hash function is used to map keys to slots in the hash table.

The insert function handles collisions by probing to find an empty slot.

The print_hash_table function displays the final contents of the hash table.