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HANDS ON ACTIVITY EMBEDDED SYSYTEMS

# Write a program to count no. of bits which are set in given binary pattern .

**Code::**

#include <stdio.h>

int countSetBits(unsigned int num) { int count = 0;

while (num) {

count += num & 1; num >>= 1;

} return count; } int main() {

unsigned int num = 0b10101010;

printf("Number of set bits: %d\n", countSetBits(num)); return 0; }

**Output:** Number of set bits: 4

1. **Write a program to set 5th and 12th bits in a 16-bit unsigned integer Code:**

#include <stdio.h>

unsigned int setBits(unsigned int num, int pos1, int pos2) { unsigned int mask = (1 << pos1) | (1 << pos2);

return num | mask;

}

int main() {

unsigned int num = 0b00000000; num = setBits(num, 5, 12); printf("Modified number: %d\n", num);

return 0;

}

**Output:** Modified number: 4864

# Write a program to clear 6th and 19th bits in a 32-bit unsigned integer. Code:

#include <stdio.h>

unsigned int clearBits(unsigned int num, int pos1, int pos2) { unsigned int mask = ~(1 << pos1) & ~(1 << pos2);

return num & mask;

}

int main() { unsigned int num = 0b1111111111111111111; num = clearBits(num, 6, 19);

printf("Modified number: %u\n", num); return 0;

}

**Output:** Modified number: 524287

# Write a program to flip even positioned bits in a 16-bit unsigned integer Code:

#include <stdio.h>

unsigned int flipEvenBits(unsigned int num) {

unsigned int mask = 0xAAAA; // Binary pattern with even bits set return num ^ mask;

}

int main() {

unsigned int num = 0b1010101010101010; // Example 16-bit unsigned integer

num = flipEvenBits(num); printf("Modified number: %d\n", num); return 0;

**Output:** Modified number: 2730

# Given an unsigned 32-bit integer holding packed IPv4 address, convert it into "a. b. c. d" format.

**Code:**

#include <stdio.h>

int countSetBits(unsigned int num) { int count = 0;

while (num) {

count += num & 1; num >>= 1;

}

return count;

}

int main() {

unsigned int num = 0b10101010; // Example binary pattern printf("Number of set bits: %d\n", countSetBits(num)); return 0;

}

**Output:** Number of set bits: 4

# Convert MAC address into 48-bit binary pattern Code:

#include <stdio.h>

void unpackIPAddress(unsigned int ip) { int a, b, c, d;

a = (ip >> 24) & 255;

b = (ip >> 16) & 255;

c = (ip >> 8) & 255;

d = ip & 255;

printf("Unpacked IP address: %d.%d.%d.%d\n", a, b, c, d);

}

int main() {

unsigned int packedIP = 3232235777; // Example packed IP address unpackIPAddress(packedIP);

return 0;

**Output:** Unpacked IP address: 192.168.1.1

# Convert 48-bit binary pattern as MAC address Code:

#include <stdio.h>

void macToBinaryPattern(char \*mac) { unsigned long long int binary = 0;

sscanf(mac, "%2hhx:%2hhx:%2hhx:%2hhx:%2hhx:%2hhx", (unsigned char

\*)&binary,

(unsigned char \*)&binary + 1, (unsigned char \*)&binary + 2, (unsigned char \*)&binary + 3, (unsigned char \*)&binary + 4, (unsigned char \*)&binary + 5);

printf("Binary pattern: %llx\n", binary);

}

int main() {

char mac[] = "12:34:56:78:9a:bc"; // Example MAC address macToBinaryPattern(mac);

return 0;

}

**Output:** Binary pattern: 123456789abc

# Convert 48-bit binary pattern to MAC address. Code:

#include <stdio.h>

void binaryPatternToMac(unsigned long long int binary)

{

printf("MAC address: %02llx:%02llx:%02llx:%02llx:%02llx:%02llx\n", (binary >> 40) & 0xFF, (binary >> 32) & 0xFF, (binary >> 24) & 0xFF, (binary >> 16) & 0xFF, (binary >> 8) & 0xFF, binary & 0xFF);

}

int main() {

unsigned long long int binary = 0x123456789abc; // Example binary pattern binaryPatternToMac(binary);

return 0;

}

**Output:** MAC address: 12:34:56:78:9a:bc