**DAA ASSIGNMENT-3**

1. Converting recursive programs to non-recursive programs. Towers

of Hanoi Problem example.

ANS:

#include <stdio.h>

typedef struct {

int n;

char from, aux, to;

int state;

} Frame;

#define SIZE 100

void hanoi\_recursive(int n, char from, char aux, char to) {

if (n == 1) {

printf("Move disk 1 from %c to %c\n", from, to);

return;

}

hanoi\_recursive(n - 1, from, to, aux);

printf("Move disk %d from %c to %c\n", n, from, to);

hanoi\_recursive(n - 1, aux, from, to);

}

void hanoi\_non\_recursive(int n, char from, char aux, char to) {

Frame stack[SIZE];

int top = 0;

stack[top++] = (Frame){n, from, aux, to, 0};

while (top > 0) {

Frame \*f = &stack[top - 1];

if (f->n == 1) {

printf("Move disk 1 from %c to %c\n", f->from, f->to);

top--;

} else if (f->state == 0) {

f->state = 1;

stack[top++] = (Frame){f->n - 1, f->from, f->to, f->aux, 0};

} else if (f->state == 1) {

printf("Move disk %d from %c to %c\n", f->n, f->from, f->to);

f->state = 2;

stack[top++] = (Frame){f->n - 1, f->aux, f->from, f->to, 0};

} else {

top--;

}

}

}

int main() {

int n;

printf("Enter number of disks: ");

scanf("%d", &n);

printf("\nRecursive Solution:\n");

hanoi\_recursive(n, 'A', 'B', 'C');

printf("\nNon-Recursive Solution:\n");

hanoi\_non\_recursive(n, 'A', 'B', 'C');

return 0;

}

A screenshot of a computer

AI-generated content may be incorrect.

2. Implementation of stack

ANS:

#include <stdio.h>

#define SIZE 100

int stack[SIZE];

int top = -1;

void push(int value) {

if (top == SIZE - 1)

printf("Stack Overflow\n");

else

stack[++top] = value;

}

int pop() {

if (top == -1) {

printf("Stack Underflow\n");

return -1;

}

return stack[top--];

}

int peek() {

if (top == -1) {

printf("Stack is Empty\n");

return -1;

}

return stack[top];

}

void display() {

if (top == -1)

printf("Stack is Empty\n");

else {

for (int i = top; i >= 0; i--)

printf("%d ", stack[i]);

printf("\n");

}

}

int main() {

push(10);

push(20);

push(30);

display();

printf("Top element is %d\n", peek());

printf("Popped element is %d\n", pop());

display();

return 0;

}

A computer screen shot of a black screen

AI-generated content may be incorrect.