

```

#include <bits/stdc++.h>
using namespace std;
//Cau truc du lieu cua mot loi goi
struct Call {
    int n;
    char a;
    char b;
    char c;
};
//Cau truc du lieu ngan xep
struct Stack {
    int top;
    Call *e;
};
//Cac phep toan ngan xep
void init(Stack &s) { //Khoi tao ngan xep rong
    s.top = -1;
    s.e = NULL;
}
bool empty(Stack s) { //Kiem tra ngan xep rong
    return s.top == -1;
}
void push(Stack &s, Call call_in) { //Day mot phan tu (loi goi) vao ngan xep
    //Cap phat bo nho cho mang e
    if (empty(s)) {
        s.e = new Call[1]; //Cap phat moi
    }
    else {
        //Cap phat them mot phan tu, cho mot loi goi
        s.e = (Call*) realloc(s.e, (s.top + 2) * sizeof(Call)); //top + 2 = n + 1
    }
    s.top++;
    s.e[s.top] = call_in;
}
void pop (Stack &s, Call &call_out) { //Lay mot phan tu (loi goi) o dinh ngan xep de xu ly
    if (empty(s)) return;

    call_out = s.e[s.top];

    if (s.top == 0) { //Lay ra va het, khoi tao ngan xep rong
        delete []s.e;
        init(s);
    }
    else { //Van con, cap phat giam 1 phan tu
        s.e = (Call*) realloc(s.e, s.top * sizeof(Call)); //top = n - 1
        s.top--;
    }
}

```

```

//Ham khu de quy cho bai toan thap Ha Noi
void thapHaNoi(Call first_call) { //first_call la loi goi dau tien - chuyen(n, a, b, c);
    Call call_in, call_out;
    Stack s;
    //Day loi goi dau tien vao ngan xep
    init(s);
    call_in = first_call;
    push(s, call_in);

    while (!empty(s)) {
        //Lay mot loi goi tu dinh ngan xep de xu ly
        pop(s, call_out);
        if (call_out.n == 1) {
            cout<<"Chuyen 1 dia tu coc "<<call_out.a<<" sang coc "<<call_out.c<<endl;
        }
        else { //n > 1 co 3 loi goi day vao ngan xep
            //Chuyen n-1 dia tu coc b sang coc c - chuyen(n-1, b, a, c)
            call_in.n = call_out.n - 1;
            call_in.a = call_out.b;
            call_in.b = call_out.a;
            call_in.c = call_out.c;
            push(s, call_in); //Day loi goi chuyen(n-1, b, a, c);

            //Chuyen 1 dia tu coc a sang coc c
            call_in = call_out;
            call_in.n = 1;
            push(s, call_in); //Day loi goi chuyen(1, a, b, c);

            //Chuyen n-1 dia tu coc a sang coc b
            call_in.n = call_out.n - 1;
            call_in.a = call_out.a;
            call_in.b = call_out.c;
            call_in.c = call_out.b;
            push(s, call_in); //Day loi goi chuyen(n-1, a, c, b);
        }
    }
}

int main(){
    Call first_call = {3, 'A', 'B', 'C'};
    thapHaNoi(first_call);
}

```