JOHNSON TROTTER

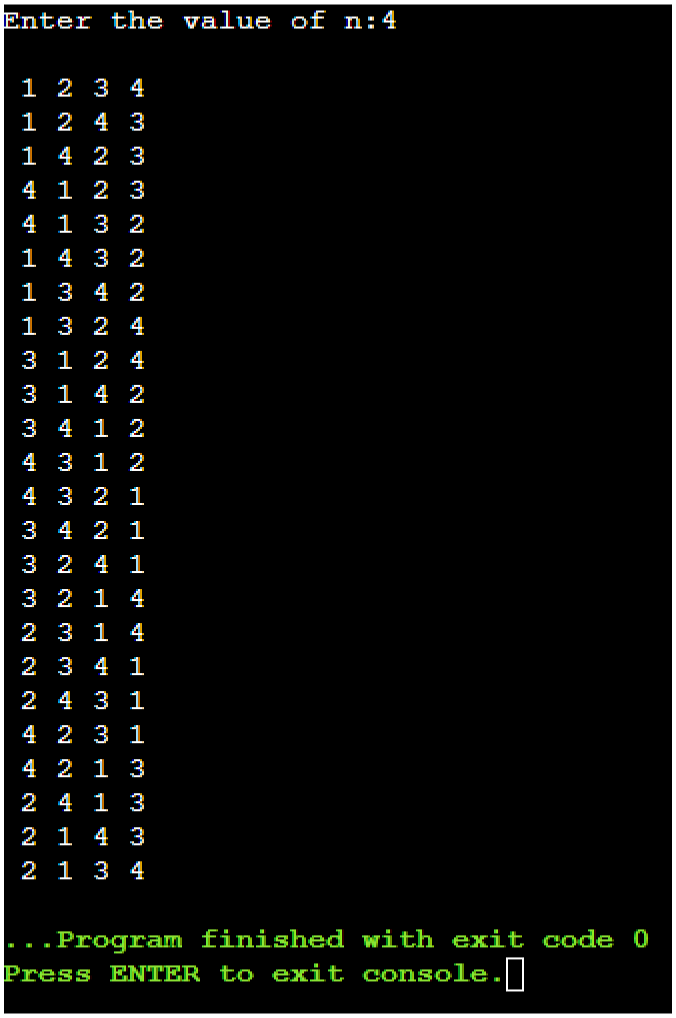
Johnson Trotter algorithm to generate permutations :

```
#include<stdio.h>
#include<conio.h>
int LEFT_TO_RIGHT= 1;
int RIGHT_TO_LEFT =0;
int searchArr(int a[], int n, int mobile){
  for (int i = 0; i < n;i++)
  if (a[i] == mobile)
  return i + 1;
}
int getMobile(int a[], int dir[], int n){
  int mobile_prev = 0, mobile =0;
  for (int i = 0; i < n; i++){
  if (dir[a[i]-1] == RIGHT_TO_LEFT && i!=0){
    if (a[i] > a[i-1] && a[i] > mobile_prev){
      mobile = a[i];
      mobile_prev = mobile;
    }
  }
  if (dir[a[i]-1] == LEFT_TO_RIGHT && i!=n-1){
    if (a[i] > a[i+1] && a[i] > mobile_prev){

      mobile = a[i];
      mobile_prev = mobile;
    }
  }
  }
  if (mobile == 0 && mobile_prev ==0)
  return 0;
  else
  return mobile;
}
int printOnePerm(int a[], int dir[], int n){
  int mobile = getMobile(a, dir,n);
  int pos = searchArr(a, n,mobile);
  if (dir[a[pos - 1] - 1] == RIGHT_TO_LEFT){
    printf("\n");
    int temp;
    temp = a[pos-1];
```

```
        a[pos-1] = a[pos-2];a[pos-2]= temp;
    }
    else if (dir[a[pos - 1] - 1] == LEFT_TO_RIGHT){
    printf("\n");
    int temp;
    temp = a[pos] ;
    a[pos] = a[pos-1];
    a[pos-1]=temp;
    }
    for (int i = 0; i < n; i++){
    if (a[i] > mobile){
        if (dir[a[i] - 1] ==LEFT_TO_RIGHT)dir[a[i] - 1] =RIGHT_TO_LEFT;
        else if (dir[a[i] - 1] ==RIGHT_TO_LEFT)dir[a[i] - 1] =LEFT_TO_RIGHT;
    }
    }
    for (int i = 0; i < n; i++)
    printf(" %d", a[i]);
}
int fact(int n){
    int res = 1;
    int i;
    for (i = 1; i <= n;i++)
    res = res * i;
    return res;
}
void printPermutation(int n){
    int a[n];
    int dir[n];
    for (int i = 0; i < n; i++){
        a[i] = i + 1;
        printf(" %d",a[i]);
    }
    for (int i = 0; i < n; i++)
    dir[i] =RIGHT_TO_LEFT;
    for (int i = 1; i < fact(n); i++)
    printOnePerm(a, dir, n);
}
int main(){
    int n;
    printf("Enter the value of n:");
    scanf("%d",&n);
    printf("\n");
    printPermutation(n);
    return 0;
}
```

OUTPUT:



```
Enter the value of n:4

 1  2  3  4
 1  2  4  3
 1  4  2  3
 4  1  2  3
 4  1  3  2
 1  4  3  2
 1  3  4  2
 1  3  2  4
 3  1  2  4
 3  1  4  2
 3  4  1  2
 4  3  1  2
 4  3  2  1
 3  4  2  1
 3  2  4  1
 3  2  1  4
 2  3  1  4
 2  3  4  1
 2  4  3  1
 4  2  3  1
 4  2  1  3
 2  4  1  3
 2  1  4  3
 2  1  3  4

...Program finished with exit code 0
Press ENTER to exit console.
```