

Write a C program to print all permutations of a given string

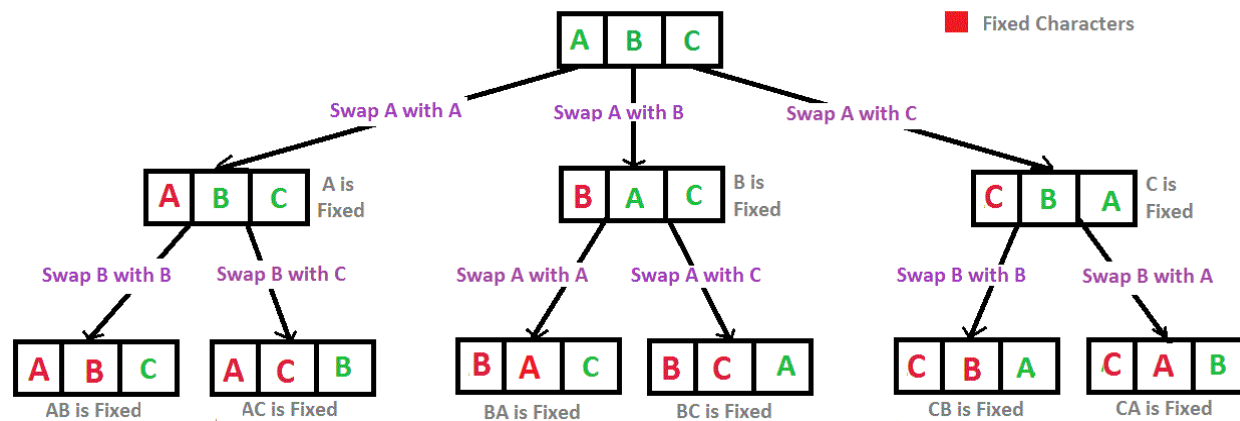
A permutation, also called an “arrangement number” or “order,” is a rearrangement of the elements of an ordered list S into a one-to-one correspondence with S itself. A string of length n has $n!$ permutation.

Source: Mathworld(<http://mathworld.wolfram.com/Permutation.html>)

Below are the permutations of string ABC.

ABC, ACB, BAC, BCA, CAB, CBA

Here is a solution using backtracking.



Recursion Tree for Permutations of String "ABC"

```
# include <stdio.h>
```

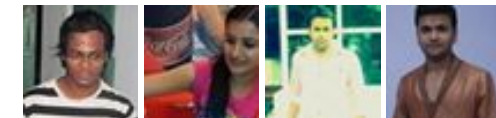
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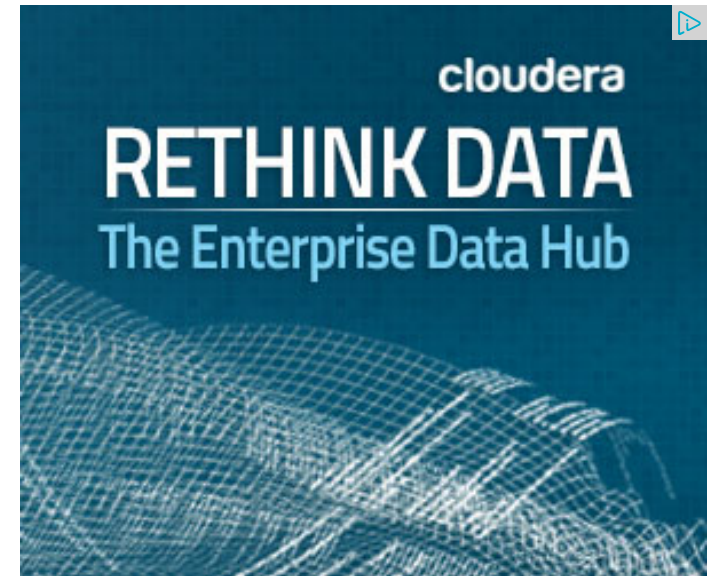
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```
/* Function to swap values at two pointers */
```

```
void swap (char *x, char *y)
```

```
{
    char temp;
    temp = *x;
    *x = *y;
    *y = temp;
}
```

```
/* Function to print permutations of string
```

```
This function takes three parameters:
```

```
1. String
```

```
2. Starting index of the string
```

```
3. Ending index of the string. */
```

```
void permute(char *a, int i, int n)
```

```
{
    int j;
    if (i == n)
        printf("%s\n", a);
    else
    {
        for (j = i; j <= n; j++)
        {
            swap((a+i), (a+j));
            permute(a, i+1, n);
            swap((a+i), (a+j)); //backtrack
        }
    }
}
```

```
/* Driver program to test above functions */
```

```
int main()
```

```
{
    char a[] = "ABC";
    permute(a, 0, 2);
    getchar();
    return 0;
}
```

Output:

ABC

ACB

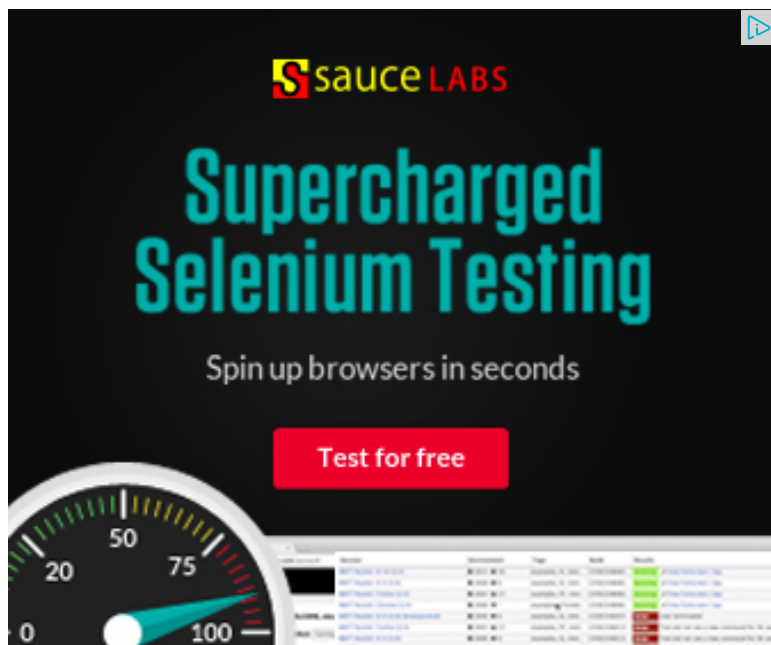
BAC

BCA

Algorithm Paradigm: Backtracking

Time Complexity: $O(n \cdot n!)$

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