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Generating subarrays using recursion

Difficulty Level : Medium • Last Updated : 18 Nov, 2021

Given an array, generate all the possible subarrays of the given array using recursion.

Examples:

Input : [1, 2, 3]

Output : [1], [1, 2], [2], [1, 2, 3], [2, 3], [3]

Input : [1, 2]

Output : [1], [1, 2], [2]

[Recommended: Please try your approach on **{IDE}** first, before moving on to the solution.](#)

We have discussed [iterative program to generate all subarrays](#). In this post, recursive is discussed.



Approach: We use two pointers **start** and **end** to maintain the starting and ending point of the array and follow the steps given below:

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Below is the implementation of the above approach.

C++

```
// C++ code to print all possible subarrays
// for given array using recursion

#include <iostream>
# include <vector>
using namespace std;

// Recursive function to print all possible subarrays
// for given array
void printSubArrays(vector<int> arr, int start, int end)
{
    // Stop if we have reached the end of the array
    if (end == arr.size())
        return;

    // Increment the end point and start from 0
    else if (start > end)
        printSubArrays(arr, 0, end + 1);

    // Print the subarray and increment the starting point
    else
    {
        cout << "[";
        for (int i = start; i < end; i++){
```



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```
,  
  
    return;  
}  
  
int main()  
{  
    vector<int> arr = {1, 2, 3};  
    printSubArrays(arr, 0, 0);  
    return 0;  
}
```

Java

```
// Java code to print all possible subarrays  
// for given array using recursion  
  
class solution  
{  
  
    // Recursive function to print all possible subarrays  
    // for given array  
    static void printSubArrays(int []arr, int start, int end)  
    {  
        // Stop if we have reached the end of the array  
        if (end == arr.length)  
            return;  
    }  
}
```



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```
{
    System.out.print("[");
    for (int i = start; i < end; i++){
        System.out.print(arr[i]+" ", " ");
    }

    System.out.println(arr[end]+" "]");
    printSubArrays(arr, start + 1, end);
}

return;
}

public static void main(String args[])
{
    int []arr = {1, 2, 3};
    printSubArrays(arr, 0, 0);

}
}
```

Python3



```
# Python3 code to print all possible subarrays
# for given array using recursion

# Recursive function to print all possible subarrays
```

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```
# Increment the end point and start from 0
elif start > end:
    return printSubArrays(arr, 0, end + 1)

# Print the subarray and increment the starting
# point
else:
    print(arr[start:end + 1])
    return printSubArrays(arr, start + 1, end)
```

```
# Driver code
arr = [1, 2, 3]
printSubArrays(arr, 0, 0)
```

C#

```
// C# code to print all possible subarrays
// for given array using recursion
using System;

class GFG
{
    // Recursive function to print all
    // possible subarrays for given array
    static void printSubArrays(int []arr,
```

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```
// Increment the end point
// and start from 0
else if (start > end)
    printSubArrays(arr, 0, end + 1);

// Print the subarray and
// increment the starting point
else
{
    Console.Write("[");
    for (int i = start; i < end; i++)
    {
        Console.Write(arr[i] + ", ");
    }

    Console.WriteLine(arr[end] + "];");
    printSubArrays(arr, start + 1, end);
}
return;
}

// Driver code
public static void Main(String []args)
{
    int []arr = {1, 2, 3};
    printSubArrays(arr, 0, 0);
}
}
```



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```
<?php
// PHP code to print all possible
// subarrays for given array using recursion

// Recursive function to print all
// possible subarrays for given array
function printSubArrays($arr, $start, $end)
{
    // Stop if we have reached
    // the end of the array
    if ($end == count($arr))
        return;

    // Increment the end point
    // and start from 0
    else if ($start > $end)
        return printSubArrays($arr, 0,
                                $end + 1);

    // Print the subarray and increment
    // the starting point
    else
    {
        echo "[";
        for($i = $start; $i < $end + 1; $i++)
        {
            echo $arr[$i];
            if($i != $end)
```



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```
}
```

```
// Driver code  
$arr = array(1, 2, 3);  
printSubArrays($arr, 0, 0);
```

```
// This code is contributed by mits  
?>
```

Javascript

```
<script>
```

```
// Javascript code to print all possible  
// subarrays for given array using recursion
```

```
// Recursive function to print all  
// possible subarrays for given array  
function printSubArrays(arr, start, end)  
{
```

```
    // Stop if we have reached the end  
    // of the array  
    if (end == arr.length)  
        return;
```

```
    // Increment the end point and start
```



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```
// ...  
else  
{  
    document.write("[");  
    for(var i = start; i < end; i++)  
    {  
        document.write( arr[i] + ", ");  
    }  
  
    document.write(arr[end] + "<br>");  
    printSubArrays(arr, start + 1, end);  
}  
return;  
}  
  
// Driver code  
var arr = [ 1, 2, 3 ];  
printSubArrays(arr, 0, 0);  
  
// This code is contributed by rutvik_56  
  
</script>
```

Output:



```
[1]  
[1, 2]  
[2]
```

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Time Complexity:  $O(n^2)$

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