

17. Implement "Sum of Subsets" using Backtracking. "Sum of Subsets" problem: Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. A suitable message is to be displayed if the given problem instance doesn't have a solution.

Program:

```
#include<stdio.h>

#include<conio.h>

int count,w[10],d,x[10];

int subset(int cs, int k, int r)
{
    int i;

    x[k]=1;

    if(cs+w[k]==d)
    {
        printf("\nSubset solution = %d\n", ++count);

        for(i=0;i<=k;i++)
        {
            if(x[i]==1)

                printf("%d\t", w[i]);

        }

    }

    else

        if(cs+w[k]+w[k+1]<=d)

            subset(cs+w[k], k+1, r-w[k]);

        if((cs+r-w[k]>=d) && (cs+w[k+1]<=d)

        {

            x[k]=0;

            subset(cs,k+1,r-w[k]);

        }

    }

}

void main()

{

    int sum=0,i,n;

    printf("Enter the number of elements\n");
```

```

scanf("%d", &n);

printf("Enter the elements in ascending order\n");

for(i=0;i<n;i++)

scanf("%d", &w[i]);


printf("Enter the required sum\n");

scanf("%d", &d);

for(i=0;i<n;i++)

sum+=w[i];

if(sum<d)

{

printf("No solution exists\n");

return;

}

printf("The solution is\n");

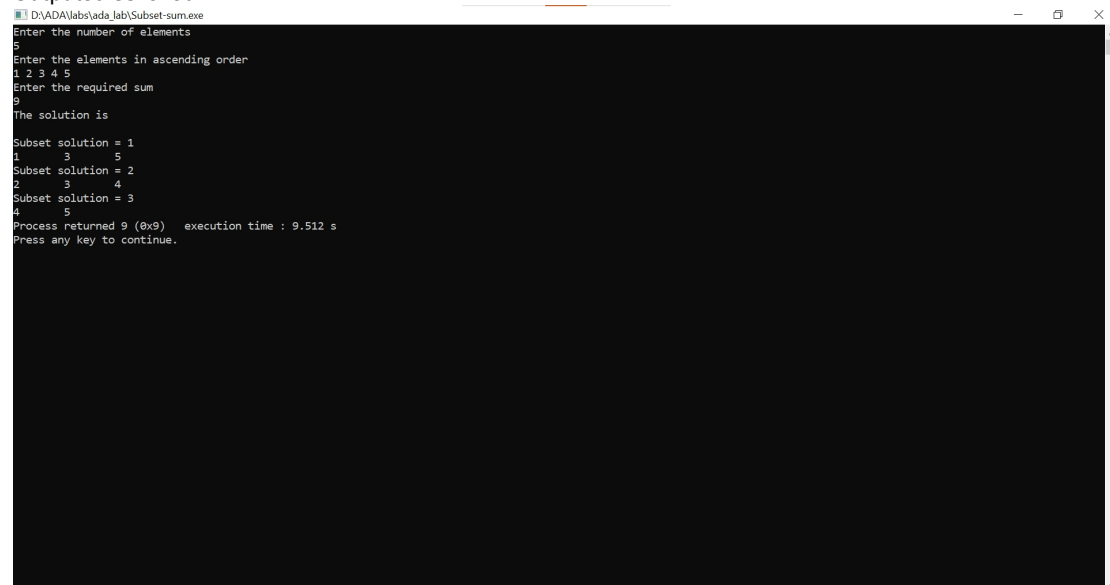
count=0;

subset(0,0,sum);

}

```

OutputScreenshot:



```

D:\VADA\labs\ada_lab\Subset-sum.exe
Enter the number of elements
5
Enter the elements in ascending order
1 2 3 4 5
Enter the required sum
9
The solution is
Subset solution = 1
1 3 5
Subset solution = 2
2 3 4
Subset solution = 3
4 5
Process returned 9 (0x9)   execution time : 9.512 s
Press any key to continue.

```