Lab 13

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Code:

```c
/*
Name     :   Prasanna Natarajan
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Inputs   :   The number of items,capacity of the knapsack and price and weights of each items
Outputs     :The maximum value that can be taken and the items that are taken in the knapsack
*/

#include<stdio.h>
#include<stdlib.h>
#include<time.h>

// #defines
#define n 4  // Number of items
#define W 5 // Weight capacity of knapsack

//global variables
int B[n+1][W+1];
//function declarations
void knapsack(int w[],int p[]);
int main(){

    int w[n],p[n]; // arrays to store weights and prices
    int i=0,j=0;
    printf("enter the weights price of each of the items"); //getting user inputs
    for(i=0;i<n;i++){
    scanf(" %d",&w[i]);
    scanf(" %d",&p[i]);
    }
    knapsack(w,p);


    for(i=0;i<=n;i++){
        for(j=0;j<=W;j++)
            printf("%d ",B[i][j]);
        printf("\n");
    }

    i=n;
    j=W;
    while(i>0 && j>0){
    if(B[i][j]!=B[i-1][j]){
        printf("The item %d is in the knapsack\n",i);
        i--;j-=w[i];
    }
    else{
```

```c
                i--;
        }

    }

    return 0;
}

void knapsack(int w[],int p[]){
        int i;
        for(i=0;i<=W;i++){
                B[0][i] = 0;
        }

        for(i=0;i<=n;i++){
                B[i][0] = 0;
        }

        int j;
        for(i=0;i<=n;i++){
                for(j=0;j<=W;j++){
                        if(w[i-1]<=j){
                                if(p[i]+B[i-1][j-w[i]] > B[i-1][j]){
                                        B[i][j] = p[i-1] + B[i-1][j-w[i-1]];
                                        //printf("1\tB[%d][%d] = %d\n",i,j,B[i][j]);
                                }
                                else{
                                        B[i][j] = B[i-1][j];
                                        //printf("2\tB[%d][%d] = %d\n",i,j,B[i][j]);
                                }
                        }
                        else if(i!=0){
                                B[i][j] = B[i-1][j];
                                //printf("3\tB[%d][%d] = %d\n",i,j,B[i][j]);
                        }
                }
        }


}
```
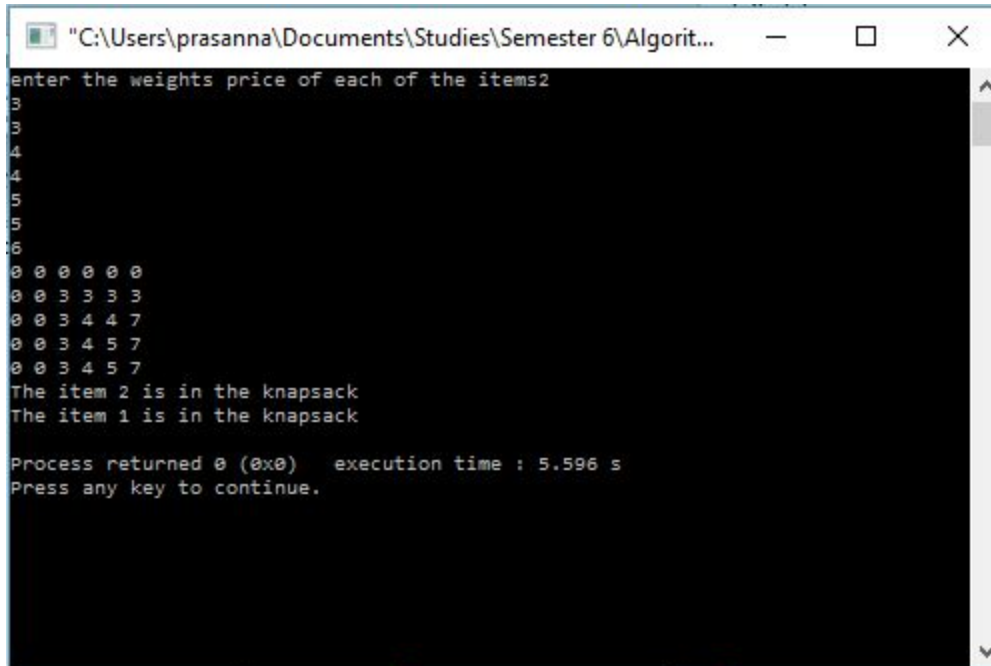
Screenshot:

```
enter the weights price of each of the items2
3
3
4
4
5
5
6
0 0 0 0 0 0
0 0 3 3 3 3
0 0 3 4 4 7
0 0 3 4 5 7
0 0 3 4 5 7
The item 2 is in the knapsack
The item 1 is in the knapsack

Process returned 0 (0x0)    execution time : 5.596 s
Press any key to continue.
```