

# Lab 8

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Code:

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/*
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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
*/

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

#define n 5 // Number of items
#define k 15 // Weight capacity of knapsack

int main(){
    double w[n],p[n]; // arrays to store weights and prices
    double value[n],index[n]; //arrays to store price/weight and sorted indeces
    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(" %lf",&w[i]);
        scanf(" %lf",&p[i]);
        value[i] = (double)p[i]/w[i];
        index[i] = i;
    }
    double temp_value[n];
    for(i=0;i<n;i++){
        temp_value[i] = value[i];
    }

    int temp;
    // sorting the value array
    for(i=0;i<n-1;i++){

        for(j=0;j<n-i-1;j++){
            if(temp_value[j] <= temp_value[j+1]){
                temp = temp_value[j];
                temp_value[j] = temp_value[j+1];
                temp_value[j+1] = temp;
                temp = index[j];
                index[j] = index[j+1];
                index[j+1] = temp;
            }
        }
    }
}
```

```

printf("value:");
for(i=0;i<n;i++){
    printf("%lf ",value[i]);
}
printf("\n");
printf("index:");
for(i=0;i<n;i++){
    printf("%lf ",index[i]);
}
printf("\n");
int curr_ind=0;
double curr_weigth = 0;
double curr_value=0;
int counter=0;
//Greedy approach to solve the problem
while(k> curr_weigth){
    curr_ind = (int)index[counter];
    counter++;
    if(curr_weigth<=w[curr_ind]){
        curr_weigth+=w[curr_ind];
        curr_value+=value[curr_ind]*w[curr_ind];
        printf("Item in the knapsack is: %d\n",curr_ind);
        printf("The current weight = %lf and value is = %lf\n",curr_weigth,curr_value);

    }
    else if(curr_weigth<k){
        int t = k-curr_weigth;
        curr_weigth = k;
        curr_value += value[curr_ind]*t;
        printf("Item in the knapsack is: %d\n",curr_ind);
        printf("The current weight = %lf and value is = %lf\n",curr_weigth,curr_value);

    }

}

return 0;
}

```

Screenshot:

```
prasanna@LENOVO-PC:/mnt/c/Users/prasanna/Documents/Studies/Semester 6/Algorithms/labs/lab8$ gcc lab8.c
prasanna@LENOVO-PC:/mnt/c/Users/prasanna/Documents/Studies/Semester 6/Algorithms/labs/lab8$ ./a.out
enter the weights price of each of the items5
6
7
8
9
1
2
3
4
5
value:1.200000 1.142857 0.111111 1.500000 1.250000
index:3.000000 4.000000 0.000000 1.000000 2.000000
Item in the knapsack is: 3
The current weight = 2.000000 and value is = 3.000000
Item in the knapsack is: 4
The current weight = 6.000000 and value is = 8.000000
Item in the knapsack is: 0
The current weight = 15.000000 and value is = 18.800000
prasanna@LENOVO-PC:/mnt/c/Users/prasanna/Documents/Studies/Semester 6/Algorithms/labs/lab8$
```