

Dynamic Programming: Implement 0/1 Knapsack problem

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

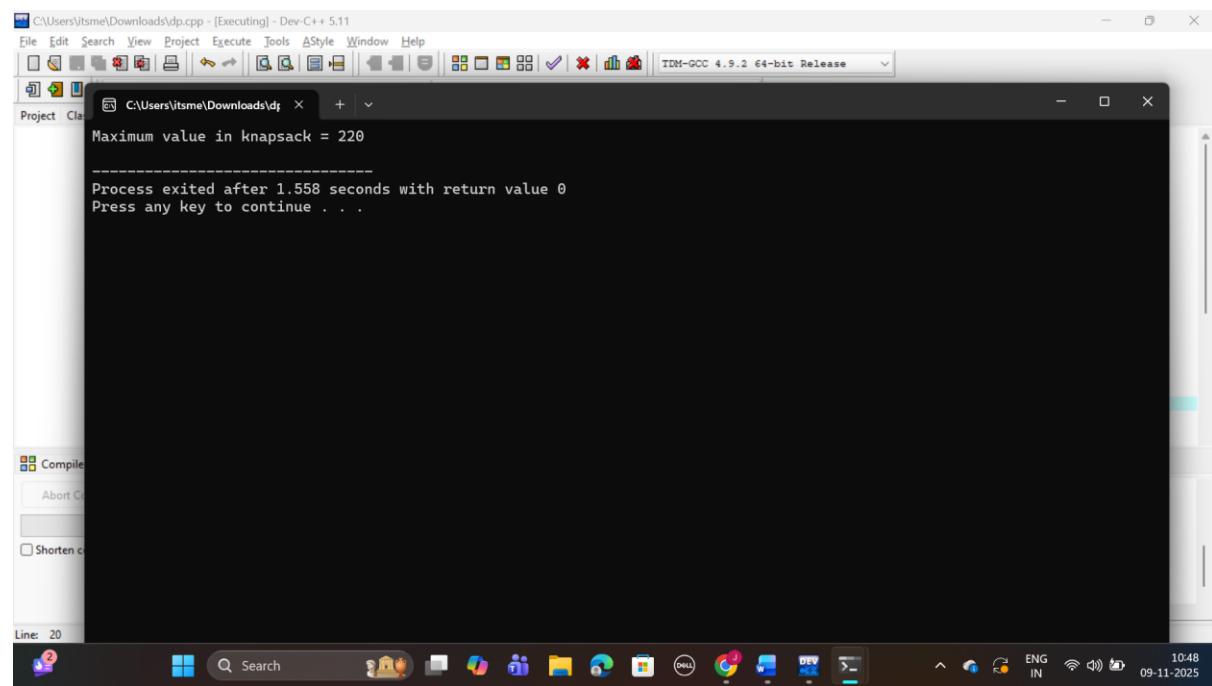
// Function to solve 0/1 Knapsack using Dynamic Programming
int knapsack(int W, const vector<int> &wt, const vector<int> &val, int n) {
    vector<vector<int>> dp(n + 1, vector<int>(W + 1, 0)); // note the space between >>

    // Build table dp[][] in bottom-up manner
    for (int i = 1; i <= n; i++) {
        for (int w = 1; w <= W; w++) {
            if (wt[i - 1] <= w) {
                dp[i][w] = max(val[i - 1] + dp[i - 1][w - wt[i - 1]], dp[i - 1][w]);
            } else {
                dp[i][w] = dp[i - 1][w];
            }
        }
    }

    return dp[n][W];
}

int main() {
    // old-style vector initialization
    int val_arr[] = {60, 100, 120};
    int wt_arr[] = {10, 20, 30};
```

```
int n = sizeof(val_arr) / sizeof(val_arr[0]);  
int W = 50;  
  
vector<int> val(val_arr, val_arr + n);  
vector<int> wt(wt_arr, wt_arr + n);  
  
cout << "Maximum value in knapsack = " << knapsack(W, wt, val, n) << endl;  
return 0;  
}
```



The screenshot shows the Dev-C++ IDE interface. The title bar reads "C:\Users\itsme\Downloads\dp.cpp - [Executing] - Dev-C++ 5.11". The menu bar includes File, Edit, Search, View, Project, Execute, Tools, AStyle, Window, and Help. The toolbar contains various icons for file operations. The main window displays the program's output in a terminal-like window:

```
C:\Users\itsme\Downloads\dp.cpp  
File Edit Search View Project Execute Tools AStyle Window Help  
Project Classpath TDM-GCC 4.9.2 f64-bit Release  
C:\Users\itsme\Downloads\dp.cpp  
Maximum value in knapsack = 220  
-----  
Process exited after 1.558 seconds with return value 0  
Press any key to continue . . .
```

The status bar at the bottom shows "Line: 20" and the system tray indicates "10:48 09-11-2025".