CSE-2202 : Algorithm

Lab Assignment– 02

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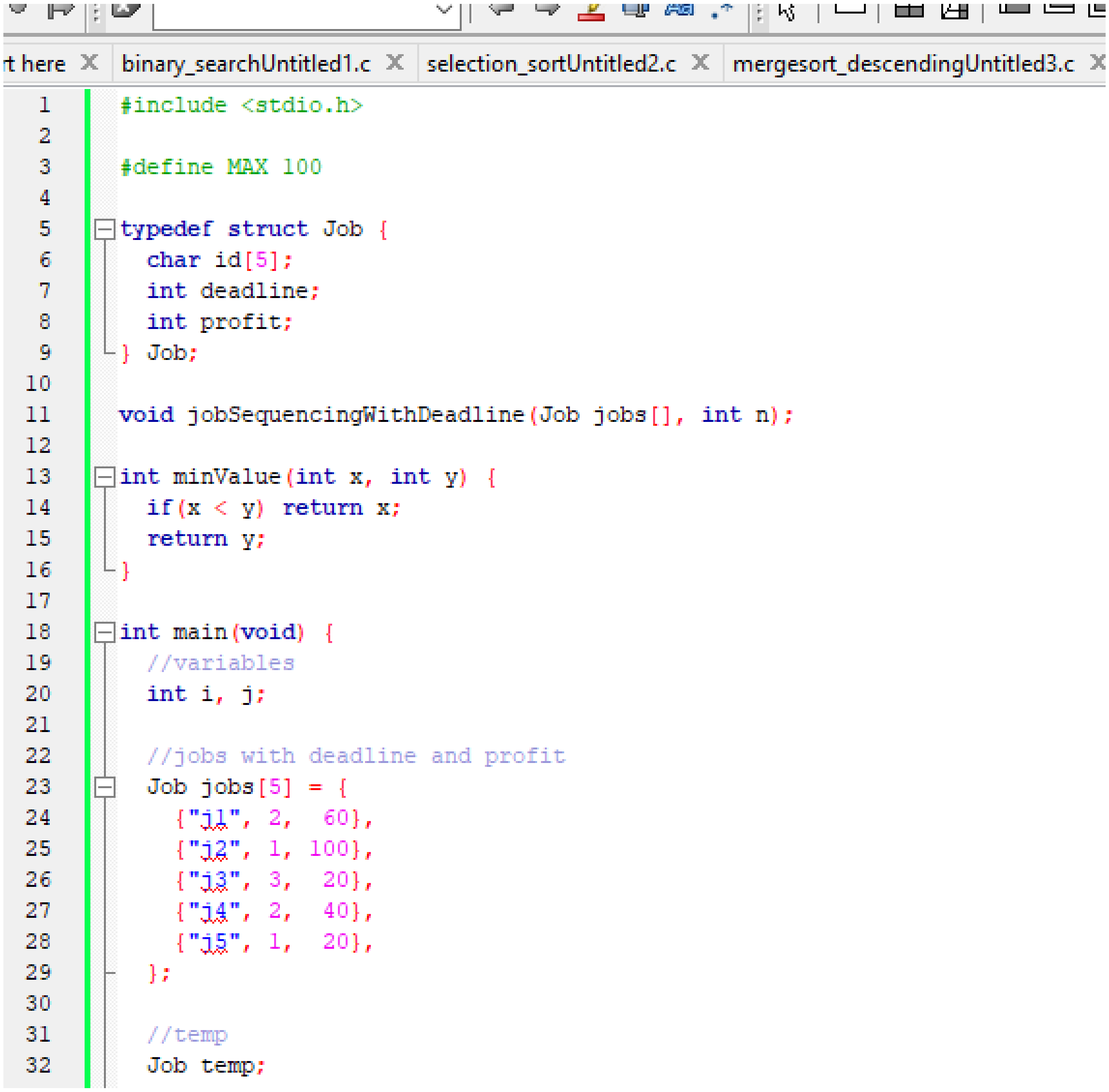
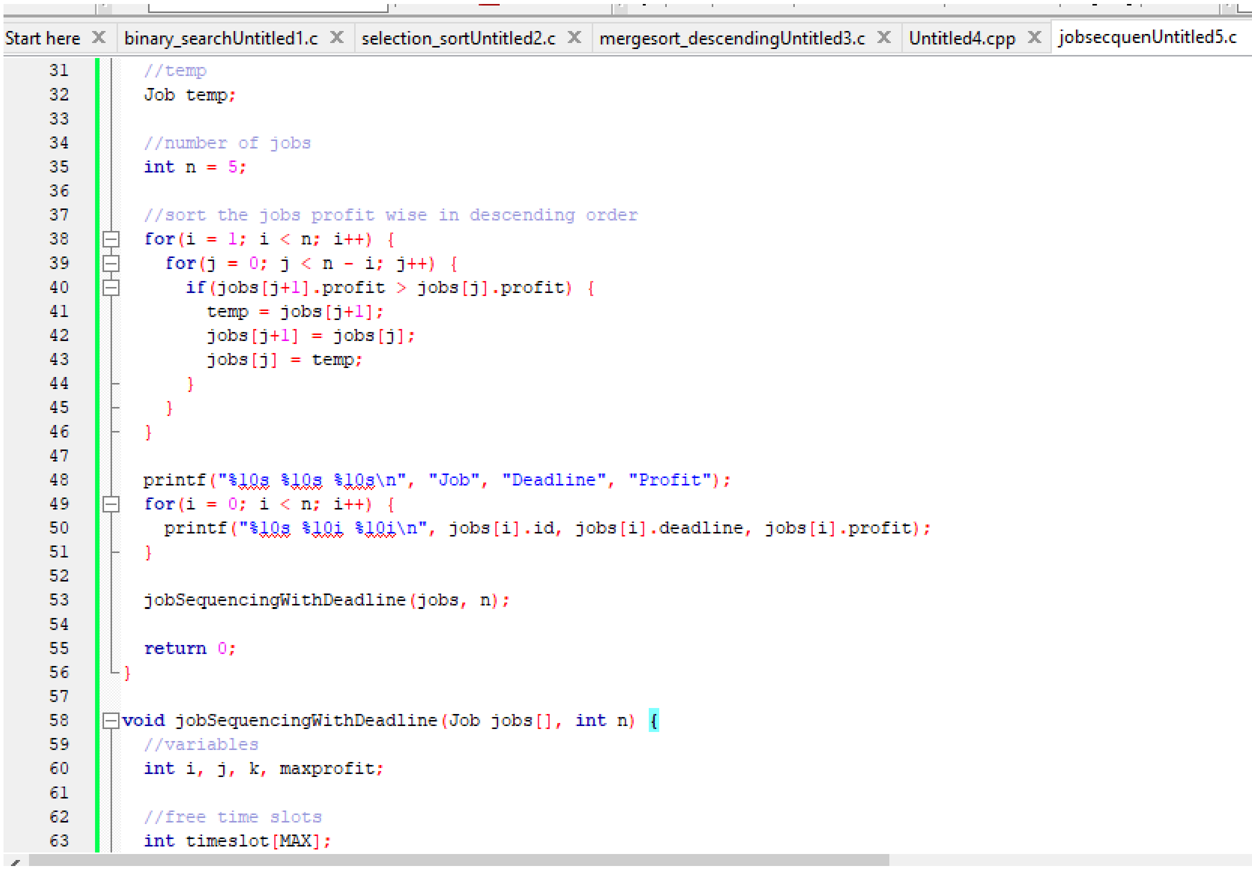
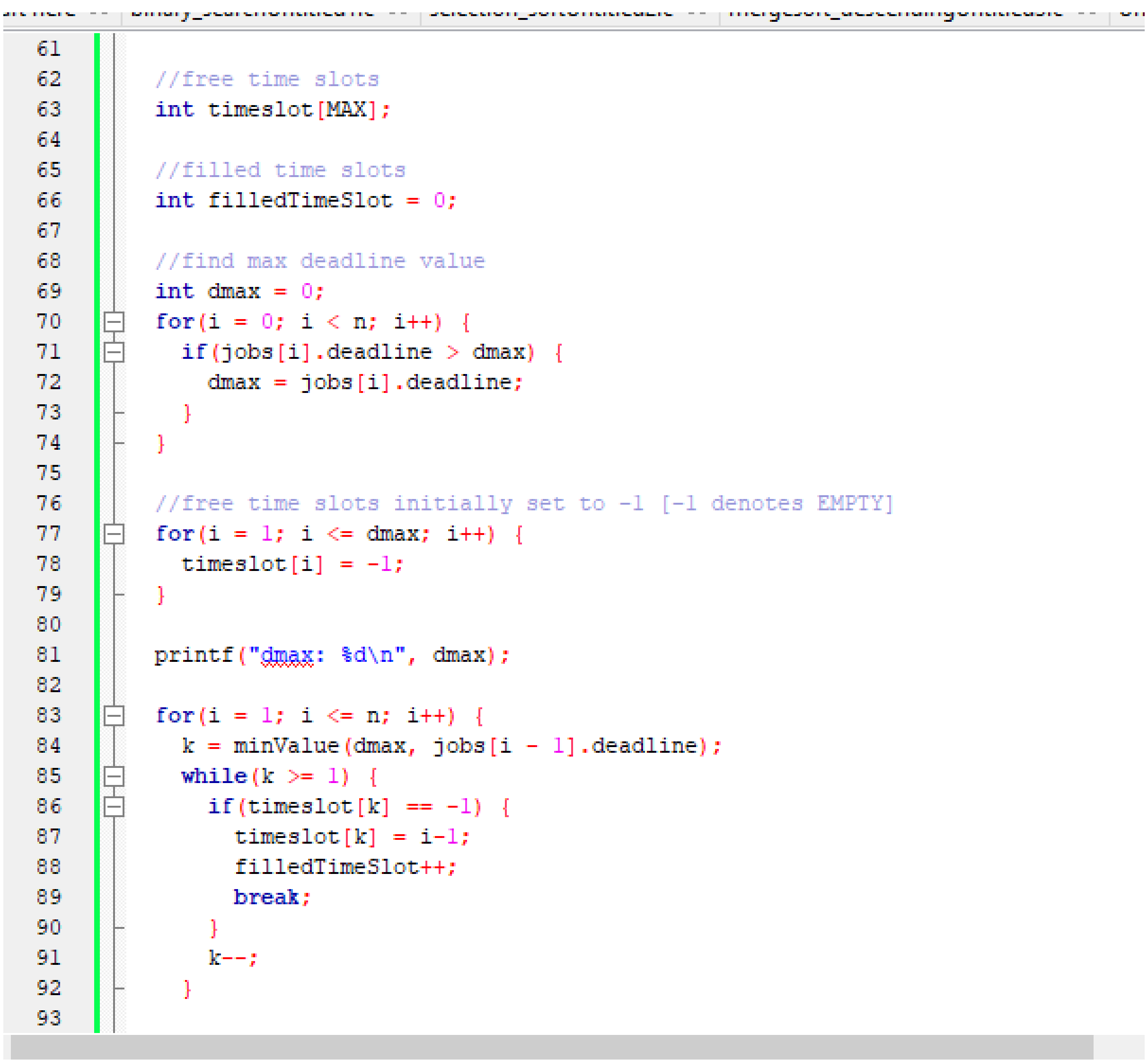
Problem 1: Job sequence



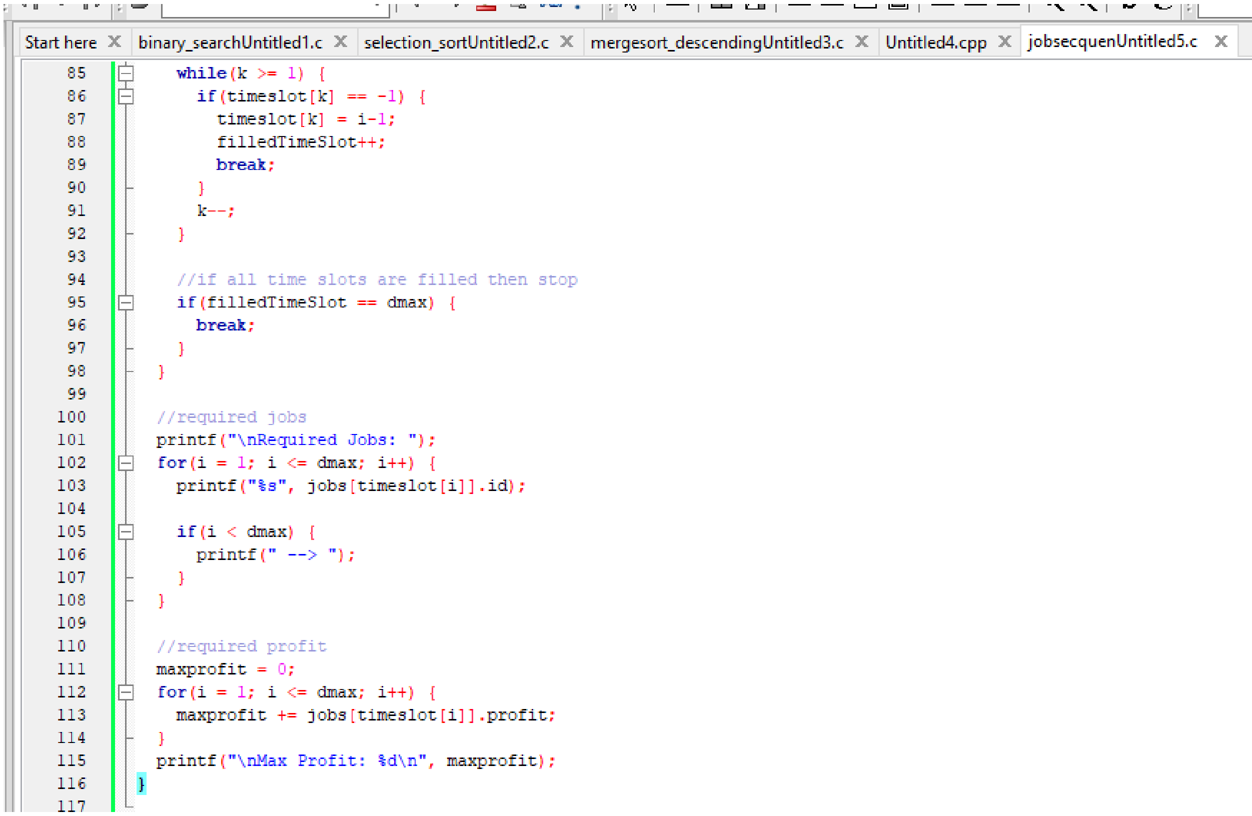
```c
#include <stdio.h>

#define MAX 100

typedef struct Job {
  char id[5];
  int deadline;
  int profit;
} Job;

void jobSequencingWithDeadline(Job jobs[], int n);

int minValue(int x, int y) {
  if(x < y) return x;
  return y;
}

int main(void) {
  //variables
  int i, j;

  //jobs with deadline and profit
  Job jobs[5] = {
    {"j1", 2,  60},
    {"j2", 1, 100},
    {"j3", 3,  20},
    {"j4", 2,  40},
    {"j5", 1,  20},
  };

  //temp
  Job temp;
```



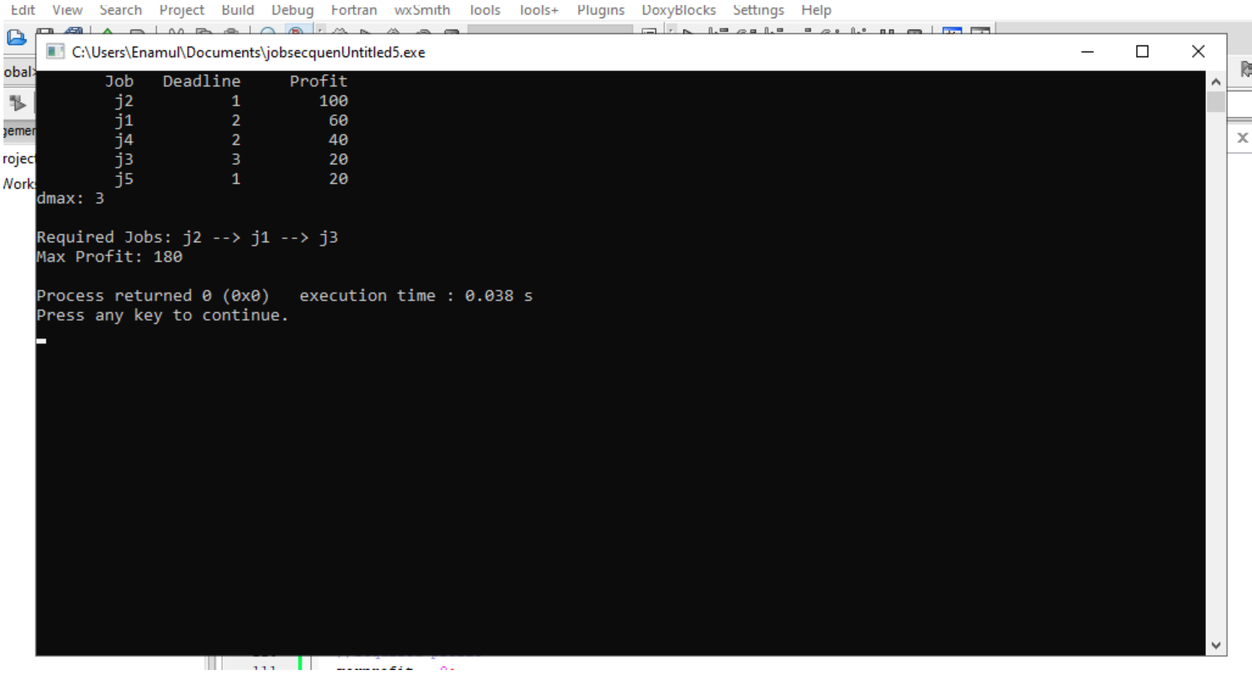
```
  //temp
  Job temp;

  //number of jobs
  int n = 5;

  //sort the jobs profit wise in descending order
  for(i = 1; i < n; i++) {
    for(j = 0; j < n - i; j++) {
      if(jobs[j+1].profit > jobs[j].profit) {
        temp = jobs[j+1];
        jobs[j+1] = jobs[j];
        jobs[j] = temp;
      }
    }
  }

  printf("%10s %10s %10s\n", "Job", "Deadline", "Profit");
  for(i = 0; i < n; i++) {
    printf("%10s %10i %10i\n", jobs[i].id, jobs[i].deadline, jobs[i].profit);
  }

  jobSequencingWithDeadline(jobs, n);

  return 0;
}

void jobSequencingWithDeadline(Job jobs[], int n) {
  //variables
  int i, j, k, maxprofit;

  //free time slots
  int timeslot[MAX];
```



```

//free time slots
int timeslot[MAX];

//filled time slots
int filledTimeSlot = 0;

//find max deadline value
int dmax = 0;
for(i = 0; i < n; i++) {
  if(jobs[i].deadline > dmax) {
    dmax = jobs[i].deadline;
  }
}

//free time slots initially set to -1 [-1 denotes EMPTY]
for(i = 1; i <= dmax; i++) {
  timeslot[i] = -1;
}

printf("dmax: %d\n", dmax);

for(i = 1; i <= n; i++) {
  k = minValue(dmax, jobs[i - 1].deadline);
  while(k >= 1) {
    if(timeslot[k] == -1) {
      timeslot[k] = i-1;
      filledTimeSlot++;
      break;
    }
    k--;
  }

```

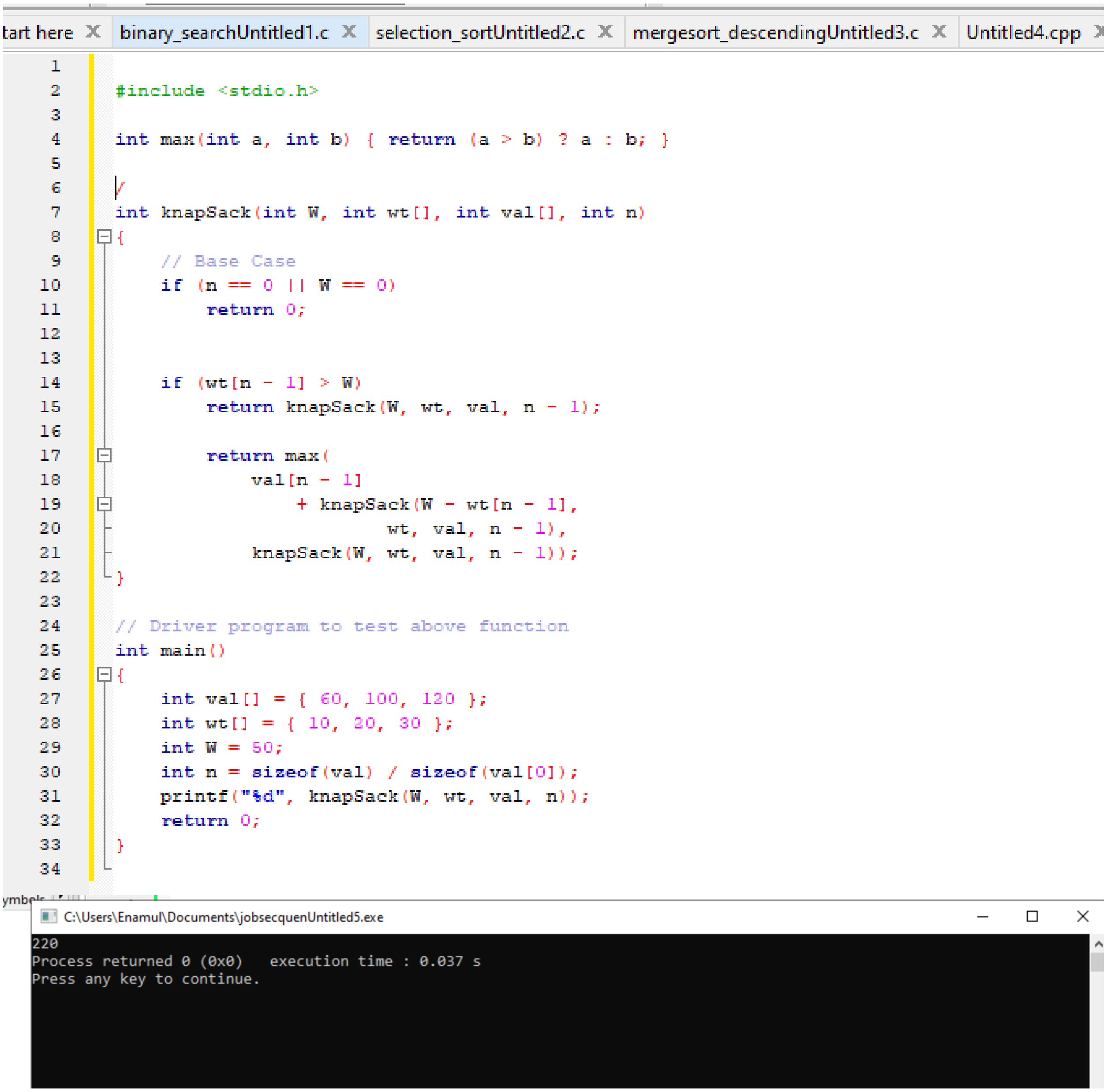


```c
    while(k >= 1) {
      if(timeslot[k] == -1) {
        timeslot[k] = i-1;
        filledTimeSlot++;
        break;
      }
      k--;
    }

    //if all time slots are filled then stop
    if(filledTimeSlot == dmax) {
      break;
    }
  }

  //required jobs
  printf("\nRequired Jobs: ");
  for(i = 1; i <= dmax; i++) {
    printf("%s", jobs[timeslot[i]].id);

    if(i < dmax) {
      printf(" --> ");
    }
  }

  //required profit
  maxprofit = 0;
  for(i = 1; i <= dmax; i++) {
    maxprofit += jobs[timeslot[i]].profit;
  }
  printf("\nMax Profit: %d\n", maxprofit);
}
```



```
       Job   Deadline     Profit
        j2          1        100
        j1          2         60
        j4          2         40
        j3          3         20
        j5          1         20
dmax: 3

Required Jobs: j2 --> j1 --> j3
Max Profit: 180

Process returned 0 (0x0)   execution time : 0.038 s
Press any key to continue.
```

Problem 2: Knapsack problem


tart here
binary_searchUntitled1.c
selection_sortUntitled2.c
mergesort_descendingUntitled3.c
Untitled4.cpp
C:\Users\Enamul\Documents\jobsecquenUntitled5.exe

```c

#include <stdio.h>

int max(int a, int b) { return (a > b) ? a : b; }

/
int knapSack(int W, int wt[], int val[], int n)
{
    // Base Case
    if (n == 0 || W == 0)
        return 0;


    if (wt[n - 1] > W)
        return knapSack(W, wt, val, n - 1);

        return max(
            val[n - 1]
                + knapSack(W - wt[n - 1],
                        wt, val, n - 1),
            knapSack(W, wt, val, n - 1));
}

// Driver program to test above function
int main()
{
    int val[] = { 60, 100, 120 };
    int wt[] = { 10, 20, 30 };
    int W = 50;
    int n = sizeof(val) / sizeof(val[0]);
    printf("%d", knapSack(W, wt, val, n));
    return 0;
}

```

```
220
Process returned 0 (0x0)   execution time : 0.037 s
Press any key to continue.
```