9101 Assignment 2
Haojin Guo
z5216214

Q5.

5. You are given n jobs where each job takes one unit of time to finish. Job i will provide a profit of g_i dollars ($g_i > 0$) if finished at or before time t_i, where t_i is an arbitrary integer larger or equal to 1. Only one job can be done at any instant of time and jobs have to be done continuously from start to finish. (Note: If a job i is not finished by t_i then there is no benefit in scheduling it at all. All jobs can start as early as time 0.) Give the most efficient algorithm you can to find a schedule that maximizes the total profit.

Solution,

1)Merge sort n jobs in descending order of profit. O(nlogn)

Meanwhile, sort n jobs in descending order of deadline. O(nlogn)

2)Create a job result sequence space, $['-1'] * \max\ \_deadline$. O(1)

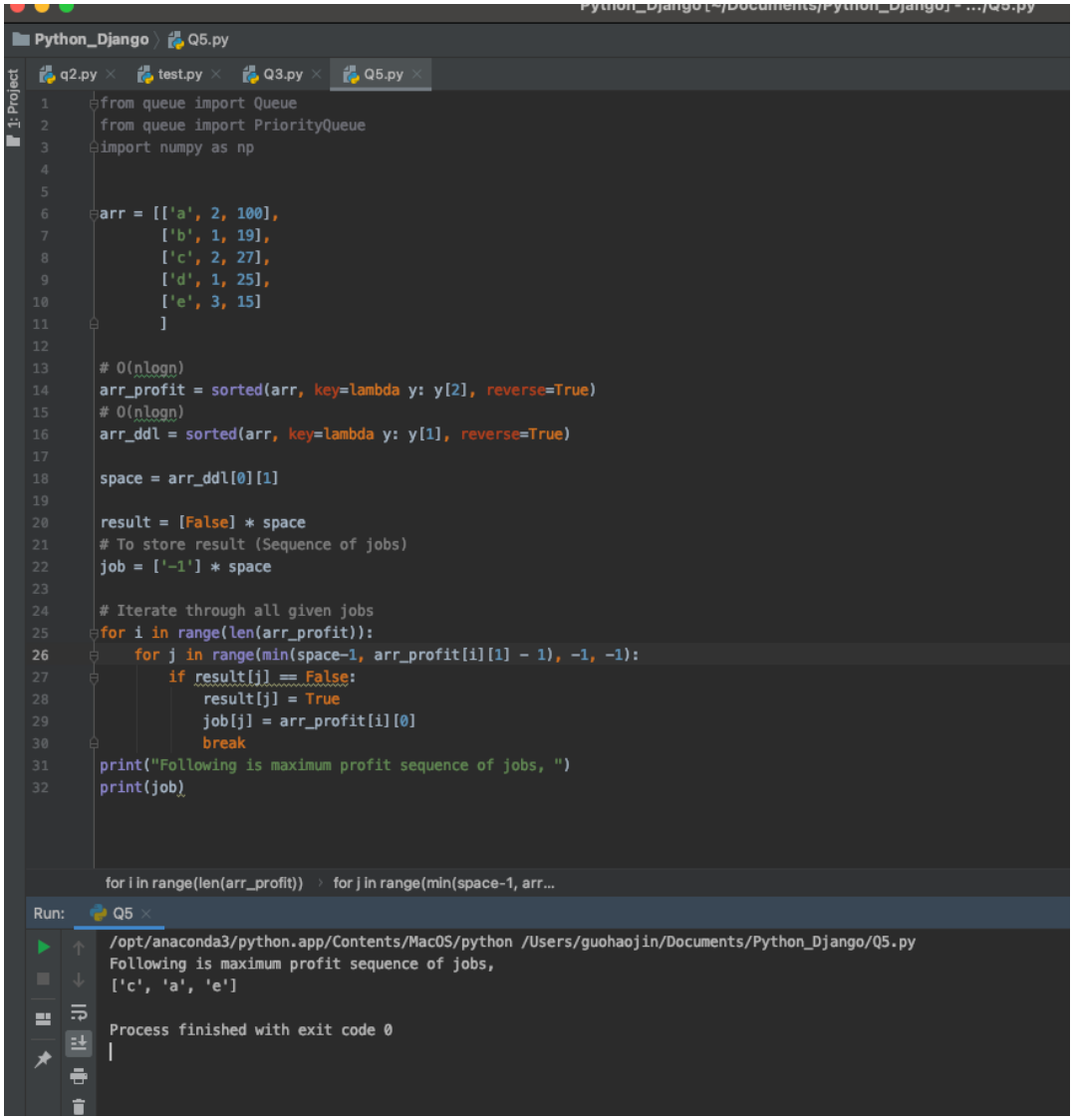
3) Iterate all the given jobs based on sorted profit.

And then go through and check each job result space.

IF the current job can fit the current result space without missing the deadline t_i, adding the current job i to the job result space, else ignore the current job i.

The cost in this step is O(n^2).

Therefore, the total cost is O(n^2).


Python_Django
Q5.py
q2.py
test.py
Q3.py
Q5.py
1: Project
from queue import Queue
from queue import PriorityQueue
import numpy as np
arr = [['a', 2, 100],
['b', 1, 19],
['c', 2, 27],
['d', 1, 25],
['e', 3, 15]
]
# O(nlogn)
arr_profit = sorted(arr, key=lambda y: y[2], reverse=True)
# O(nlogn)
arr_ddl = sorted(arr, key=lambda y: y[1], reverse=True)
space = arr_ddl[0][1]
result = [False] * space
# To store result (Sequence of jobs)
job = ['-1'] * space
# Iterate through all given jobs
for i in range(len(arr_profit)):
for j in range(min(space-1, arr_profit[i][1] - 1), -1, -1):
if result[j] == False:
result[j] = True
job[j] = arr_profit[i][0]
break
print("Following is maximum profit sequence of jobs, ")
print(job)
for i in range(len(arr_profit)) › for j in range(min(space-1, arr...
Run:
Q5
/opt/anaconda3/python.app/Contents/MacOS/python /Users/guohaojin/Documents/Python_Django/Q5.py
Following is maximum profit sequence of jobs,
['c', 'a', 'e']
Process finished with exit code 0