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Branch - CBA   Batch - 51
AAD Practical 12

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 12

Problem : A thief is robbing a store and can carry a maximal weight of W into his knapsack. There are n items available in the store and the weight of ith item is wi and its profit is pi. What items should the thief take? In this context, the items should be selected in such a way that the thief will carry those items for which he will gain maximum profit. Hence, the objective of the thief is to maximise the profit.

Implement Program for fractional knapsack using Greedy design technique.
Note: First solve the example : Capacity=60

Item	**A**	**B**	**C**	**D**
Profit	280	100	120	120
Weight	40	10	20	24

Sample Input:-
```
p=[280,100,120,120]
w=[40,10,20,24]
capacity=60
```

Sample Output:-
```
Profit  [100, 280, 120, 120]
Weight  [10, 40, 20, 24]
Ratio  [10.0, 7.0, 6.0, 5.0]
[1, 1, 0.5, 0]
Total profit :  440.0
```

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Code :

```
import YSL_io


def f_knpsck(n, W, P, w):
ratios = []
profit = 0
picked = [0] * n

for i in range(n):
ratio = P[i] / w[i]
ratios.append((i, ratio, P[i], w[i]))

ratios.sort(key=lambda x: -x[1])

YSL_io.printCYN("\n\tRatio", end=", ")
YSL_io.printGRN("Profit", end=", ")
YSL_io.printCYN("Weight", end=", ")
YSL_io.printGRN("Fraction")

for i in range(n):
index, ratio, value, weight = ratios[i]
if W > 0 and weight ⩽ W:
fraction = 1.0
else:
```

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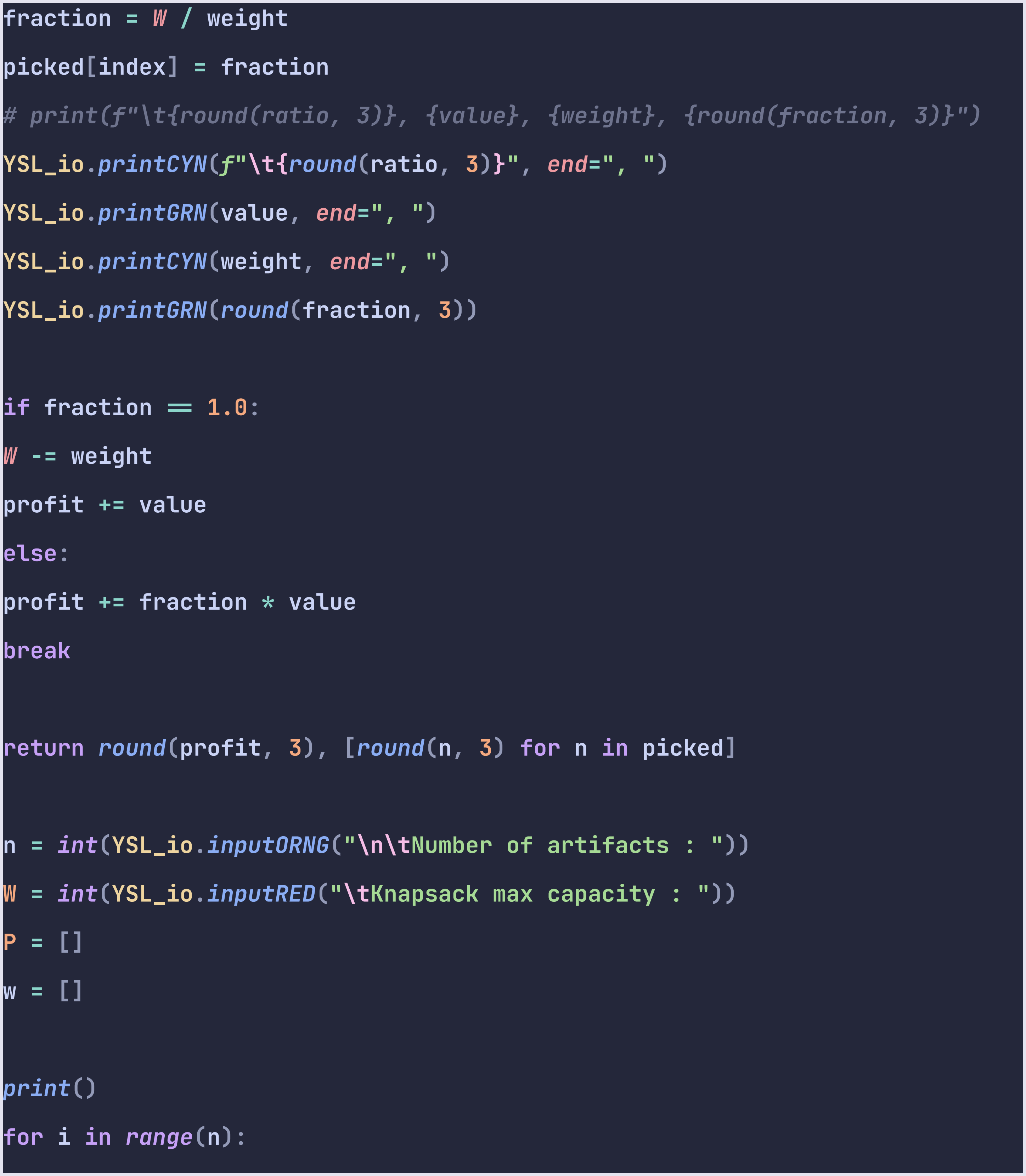

```python
fraction = W / weight

picked[index] = fraction

# print(f"\t{round(ratio, 3)}, {value}, {weight}, {round(fraction, 3)}")

YSL_io.printCYN(f"\t{round(ratio, 3)}", end=", ")

YSL_io.printGRN(value, end=", ")

YSL_io.printCYN(weight, end=", ")

YSL_io.printGRN(round(fraction, 3))


if fraction == 1.0:

W -= weight

profit += value

else:

profit += fraction * value

break


return round(profit, 3), [round(n, 3) for n in picked]


n = int(YSL_io.inputORNG("\n\tNumber of artifacts : "))

W = int(YSL_io.inputRED("\tKnapsack max capacity : "))

P = []

w = []


print()

for i in range(n):
```

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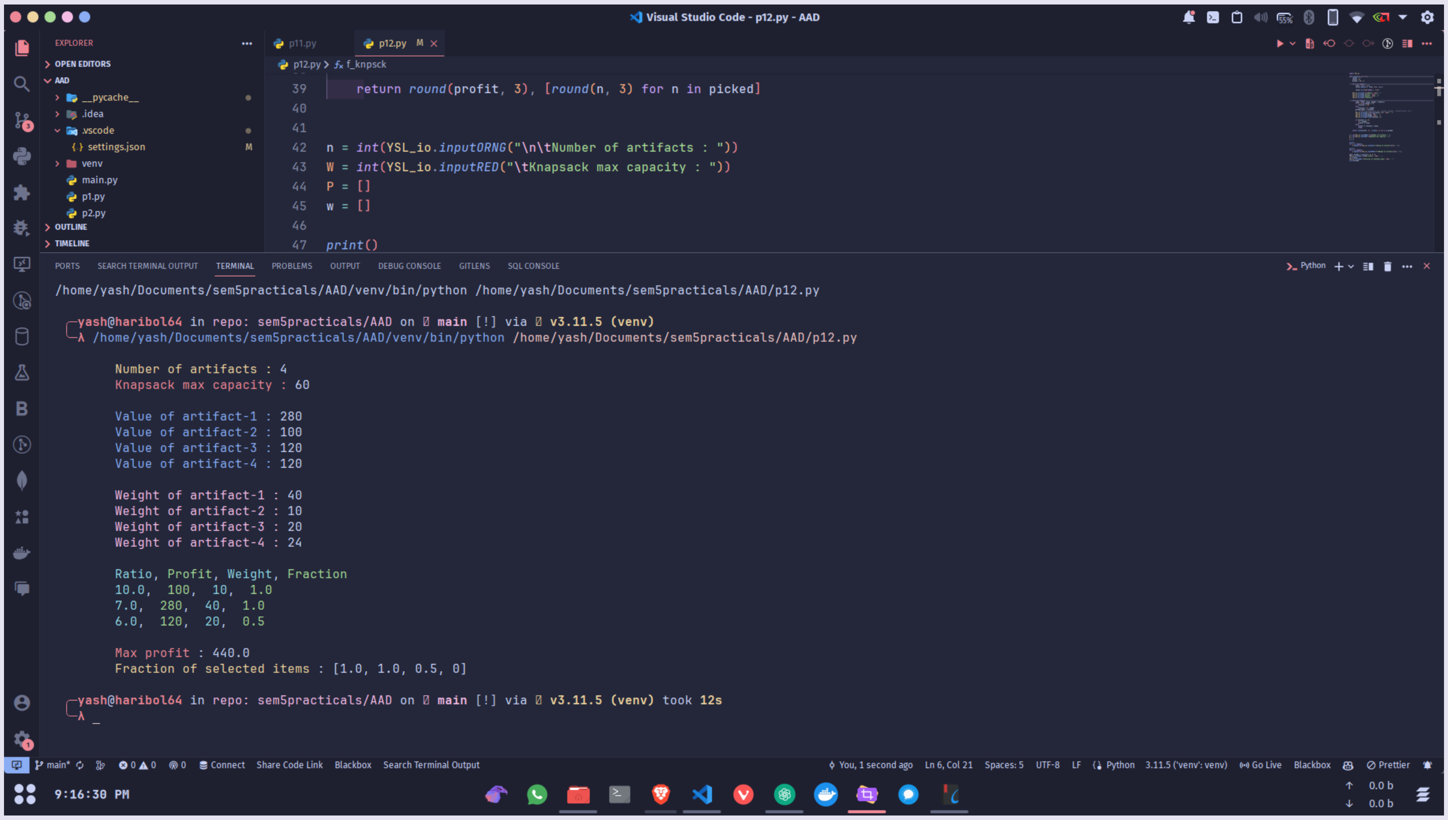
```
P.append(int(YSL_io.inputBLU(f"\tValue of artifact-{i+1} : ")))


print()
for i in range(n):
w.append(int(YSL_io.inputMGNTA(f"\tWeight of artifact-{i+1} : ")))


maxp, picked = f_knpsck(n, W, P, w)
YSL_io.printRED("\n\tMax profit", end=' : ')
print(maxp)
YSL_io.printORNG("\tFraction of selected items", end=' : ')
print(picked)
```

Screenshot :



Visual Studio Code - p12.py - AAD
p11.py
p12.py M
p12.py > f_knpsck
EXPLORER
OPEN EDITORS
AAD
PORTS SEARCH TERMINAL OUTPUT TERMINAL PROBLEMS OUTPUT DEBUG CONSOLE GITLENS SQL CONSOLE
main* Connect Share Code Link Blackbox Search Terminal Output
You, 1 second ago Ln 6, Col 21 Spaces: 5 UTF-8 LF Python 3.11.5 ('venv': venv) Go Live Blackbox Prettier
9:16:30 PM

```
        return round(profit, 3), [round(n, 3) for n in picked]


n = int(YSL_io.inputORNG("\n\tNumber of artifacts : "))
W = int(YSL_io.inputRED("\tKnapsack max capacity : "))
P = []
w = []

print()
```

```
/home/yash/Documents/sem5practicals/AAD/venv/bin/python /home/yash/Documents/sem5practicals/AAD/p12.py

 ┌yash@haribol64 in repo: sem5practicals/AAD on  main [!] via  v3.11.5 (venv)
 └λ /home/yash/Documents/sem5practicals/AAD/venv/bin/python /home/yash/Documents/sem5practicals/AAD/p12.py

        Number of artifacts : 4
        Knapsack max capacity : 60

        Value of artifact-1 : 280
        Value of artifact-2 : 100
        Value of artifact-3 : 120
        Value of artifact-4 : 120

        Weight of artifact-1 : 40
        Weight of artifact-2 : 10
        Weight of artifact-3 : 20
        Weight of artifact-4 : 24

        Ratio, Profit, Weight, Fraction
        10.0,  100,  10,  1.0
        7.0,  280,  40,  1.0
        6.0,  120,  20,  0.5

        Max profit : 440.0
        Fraction of selected items : [1.0, 1.0, 0.5, 0]

 ┌yash@haribol64 in repo: sem5practicals/AAD on  main [!] via  v3.11.5 (venv) took 12s
 └λ _
```