

Current PSP 55.53 → 60

Nov23_PSP_17Apr

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You want to buy an iPhone

Amazon

1.2 Lakhs

Flipkart

1.1 Lakhs

Apple

1.3 Lakhs

Where will you buy this from?

Flipkart

Example 2:

Suppose you get 3 offers from different companies

CTC	Location	Company
25 Lakhs	Remote	Startup
26 Lakhs	Your City	Mid Tier
28 Lakhs	2000 KMS	MANGA

→ Unique choices for individuals

Q1 → In a recent expansion into grocery delivery, Flipkart faces a crucial challenge in ineffective inventory management. Each grocery item on platform carries its own expiration date $A[i]$ and profit margin $B[i]$. To minimize potential losses we need to sell all items before its expiry. Return the maximum profit for the given products.

$A[i]$ → expiration time for item i

$B[i]$ → profits for item i

Time t starts at 0, and it takes 1 unit of time to sell one product.

Item can only be sold when $t < A[i]$

Example

$A[i] =$

3	1	3	2	3
---	---	---	---	---

$B[i] =$

6	5	3	1	9
---	---	---	---	---

0 1 2 3 4

T	Item Index	Profit
0	1	5
1	4	9
2	0	6

= 20

prioritize higher profits

T	Item Index	Profit
0	4	9
1	0	6
2	2	3

Total = 18

Can we do better?

The greedy approach selecting a technique to be greedy based on few parameters and assuming this path will give correct answer

Quiz 1

Maximize profit

A =

1	2
---	---

B =

3	1500
---	------

0 1

T	Item Index	Profit
0	0	3
1	1	1500

Total = 1503

Observation

If you are Flipkart what is your ideal profit ? → sum of all profits

If you want to sell everything you need to prioritize expiration time

SORT BASED ON EXPIRY (ACI)

↓

A =	1	3	3	3	5	5	5	8
B =	5	2	7	1	4	3	8	1
	0	1	2	3	4	5	6	7

T	Index	$AC[i] > T$	Profit
0	0	$1 > 0$	5
1	1	$3 > 1$	2 8
2	2	$8 > 2$	7
3	4	$5 > 3$	4
4	5	$5 > 4$	3
5	7	$8 > 5$	1
		Total	28

At any point if we are unable to choose the item $T \geq AC[i]$, get rid of least profit and pick current item

↓ Min Heap

A =	1	3	3	3	5	5	5	8
B =	5	2	7	1	4	3	8	1
	0	1	2	3	4	5	6	7

↑
t=5

5	2	7
4	3	8
1		

Min Heap

pseudo code

// sort the arrays based on A[i]

heap = heapify (C)

int t=0;

for (i=0; i<n; i++) {

 if (t < A[i]) { // time less than expiry

 heap.insert (B[i]);

 t++;

 }

 else {

 if (B[i] > heap[0]) {

 // Replace B[i] with heap head

 heap.extract min();

 heap.insert (B[i]);

 }

}

}

```

for (i=0; i < heap.size(); i++) {
    |   ans += heap[i];
    |
    3

```

Ques 2:

T.C = $O(n \log n)$ S.C = $O(n)$

Q → There are N students with their marks. The teacher has to give them candies such that

- 1) Each student should have at least one candy
- 2) Students with more marks than any of his/her neighbours have more candy than them

example

marks =

1	5	2	1
---	---	---	---

candies =

1	3	2	1
---	---	---	---



total = 7

There are 2 neighbours
left, right

look at them one at a
time

Quiz 3

What are the minimum number of candies teacher has to use if marks are

4	4	4	4	4
---	---	---	---	---

4	4	4	4	4
---	---	---	---	---

1	1	1	1	1
---	---	---	---	---

total = 5

Quiz 4

Return minimum candies if marks is

marks =	1	6	3	1	10	12	20	5	2
candies =	1	3	2	1	2	3	4	2	1



pseudo code

```
int c[N];
```

```
for (i=0; i<n; i++) c[i]=1;
```

// Left neighbour

```
for (i=1; i<n; i++) {
```

```
    |
```

```
    if (A[i] > A[i-1]) c[i] = c[i-1] + 1;
```

```
}
```


// Right neighbour

for $i = n-2$; $i \geq 0$; $i--$ {

 if $(A[i] > A[i+1])$ {

 if $(c[i] < c[i+1] + 1)$ $c[i] = c[i+1] + 1$;

 }

 }

ans = sum(c)

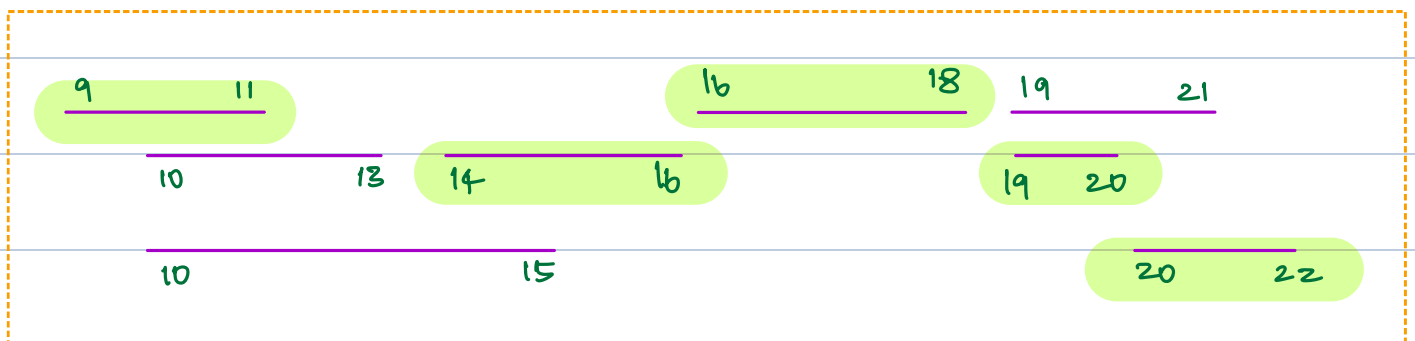
Break : 10:20pm

T.C = $O(n)$ S.C = $O(n)$

Q → Given N jobs with their start and end times.
Find the maximum number of jobs that can be
completed if only one job can be done at a time. ★★

S =	9	10	10	14	16	19	19	20
E =	11	13	15	16	18	20	21	22

$E[i-1] \leq S[i]$



Visualize

Approach

When can we pick up new tasks

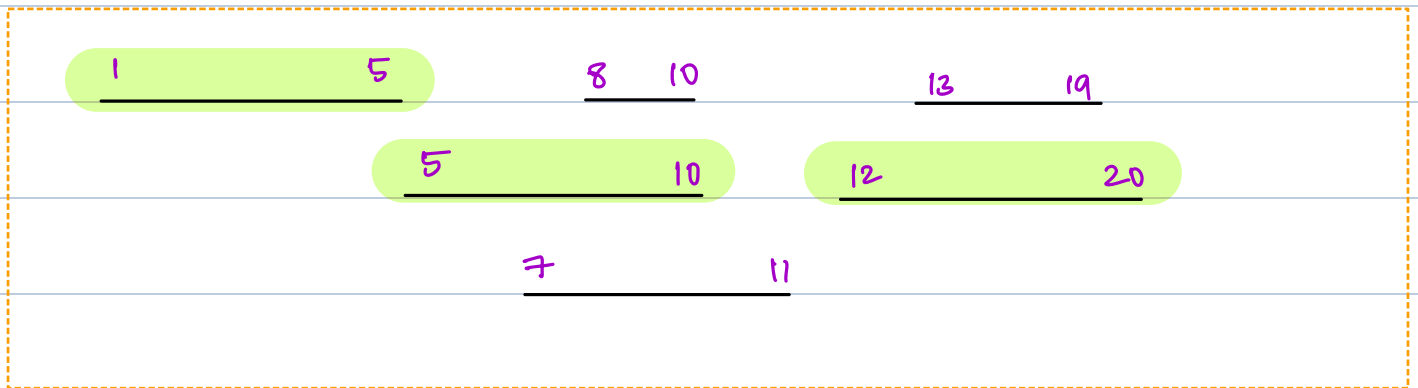
condition $E[i-1] \leq S[i]$

Quiz 5

What is the maximum number of jobs one person can do if only one job at a time is allowed the start times and end times of jobs are:

S =	1	5	8	7	12	13
E =	5	10	10	11	20	19

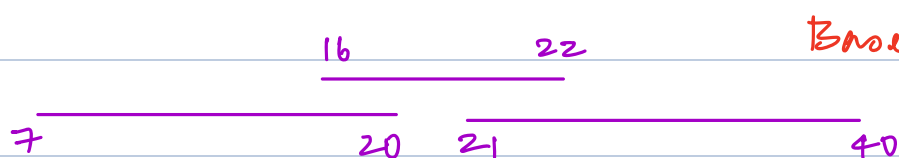
max jobs = 3



Visualize

Greedy Approaches

① less duration to complete more jobs



Based on duration

No No

② start jobs based on start time Based on start time

2 100

3 10 11 20 30 50 60 99

No No

③ start + min duration \rightarrow early ending



$S =$	1	5	8	7	13	12
$E =$	5	10	10	11	19	20

end time = 19

Ans = 3

① sort based on ending time

for $i = 1; i < n; i++$ {

if ($S[i] \geq \text{end time}$) {

$\text{ans}++;$

$\text{end time} = E[i]$

}

}

Contest \rightarrow next Friday

Trees / Heaps / Greedy