621. Task Scheduler

Date / /
Page No.

↳ Greedy + PQ

eg:- ['A', 'A', 'A', 'B', 'B', 'D'] n = 2

Soln:- ans = 8

A B ? A B ? A D → 8 unit of time

eg:- ['A', 'C', 'A', 'D', 'D', 'B'] n = 1

Soln:- 6

A B A B G D = 6

Intution :-

eg:- ['A', 'C', 'A', 'B', 'D', 'D', 'A', 'A', 'A', 'A'] n = 1

Here how you can do tasks.

Suppose you do task like

frequencies
A = 6
B = 2
C = 1
D = 1

C D B A B A ? A ? A ? A ? A

↳ 15 unit of time / cycle

Can you do better??

यहाँ A की frequency ज्यादा है और उसे हमने last के लिए execute होने के लिए छोड़ा है जो कि सही नहीं है।

Teacher's Signature

bcz ज्यादा frequencies वाले task को पहले या last में execut करवाते हैं तो इनके बीच में ideal → ? cpu cycles की requirement होगी।

So we want here that, the tasks whose frequency is more execute first than other.

like that

eg:- ['A', 'C', 'A', 'B', 'D', 'B', 'A', 'A', 'A', 'A']

A = 6
B = 2
C = 1
D = 3

n = 1

So इसे ऐसे execute करवाओ।

A → A A A A A A
gap gap gap gap gap

to fill this gap use other task or if other tasks are not available then use cpu Idle cycle.

A B A B A C A D A ? A → CPU Idle cycle
↑ ↑ ↑ ↑
gap filling via task

Teacher's Signature

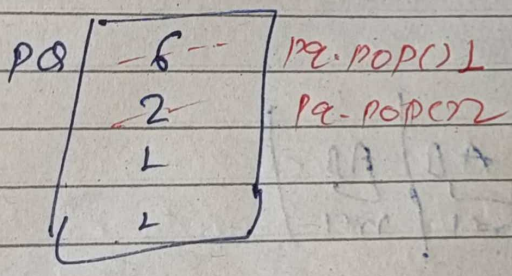
Greedy:- जिस task की freq ज्यादा है उसे पहले execute करना है।

To pick every time maximum frequency use a MAX Heap / priority queue.

e.g. ['A', 'C', 'A', 'B', 'D', 'B', 'A', 'A', 'A', 'A']

A = 6
B = 2
C = 1
D = 1

Sol:- पहले हम task को pick किया from pq



freq1 = ~~6~~ → 5

A —
↳ यह 'A' task दोबारा n cycle के बाद execute होगा तो इन n cycle में other task execute करने दो for executing other task pop from pq.
here n = 1

A
freq1 = 5 → store task also to reinsertion in pq.
freq2 = ~~2~~ 1

AB
↳ n+1 time loop चला

Teacher's Signature
{5, 2, 1}

Now

AB|
n+1

वापस freq 1 = pq.top() = 5 = 4
execute this

S
1
1
1
pq

A_
freq 2 = pq.top() = 1 = 0
execute tIMIS

AB

temp = {4, 0}, जिसकी freq '0' हो pq में मत डालो।

AB | AB |
n+1 | n+1

Now
freq 1 = 4 → A
freq 2 = 0 1 → C

4 → A
1 → C
1 → D

AC   {3, 0}

AB | AB | AC
n+1 | n+1 | n+1

Now
freq 1 = 3
freq 2 = 1

AD| {2, 0}

to
3 → A
1 → D

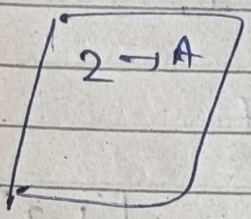
Teacher's Signature

A B | A B | A C | A D
n+1 n+1 n+1 n+1

Now

freq A = 2

freq 2 = → Here pq have no element so can't pop from pq. So 1 CPU idle.



A ?

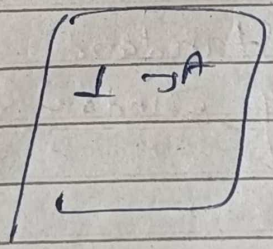
{ if(

A B | A D | A C | A D | A ?
n+1 n+1 n+1 n+1 n+1

Now

freq A = 1

freq 2 = → no tasks



A → for

if you insert in pq there is no task inserted in pq. So

if(pq.empty)

{ cycle += temp.size;

}

Teacher's Signature