

l abda

ansLen=7
ans= c p a d a b

SP
a b c c p a d a b g
ep

```
while(ep<s.length()){
    //introduce the new person in the window
    hw.put( s.charAt(ep) , hw.getDefault(s.charAt(ep),0) + 1 );

    //I will try to update the answer and shrink the window if possible
    while(isValid(ht,hw)){
        if(ansLen > ep-sp+1){
            ans = s.substring(sp,ep+1);
            ansLen = ep-sp+1;
        }
        hw.put(s.charAt(sp) , hw.get(s.charAt(sp)) - 1);
        sp++;
    }
    ep++;
}
```

| ht | hw |
|-------|--------------|
| a : 2 | a: 2 c: 1 |
| b : 1 | b: 1 p: 1 |
| d : 1 | d: 1 |

- 1 include new element in window
- 2 Shrink as much as possible / calculate
Shrink until window is invalid.
- 3 expand

- 1 create hashMap
- 2 hw = empty
- 3 sp=0, ep=0
- 4 while(ep < s.length()) {

hw.add(s.charAt(ep))
while(isValid(ht,hw)){
try to update the answer
shrink => freq[s.charAt(sp)]--; sp++;
}
ep++

s = a b c c p a d a b g
t = a b d a



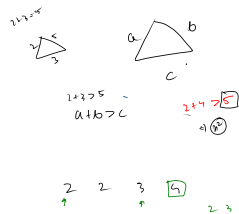
| ht | hw |
|-------|--------------|
| a : 2 | a: 1 p: 0 |
| b : 1 | b: 1 d: 1 |
| d : 1 | c: 0 g: 1 |

ans = a d a b

7 → 4

longest window
a b c c p a d a b g
k=2
ans="a b c c p a d a b g"
c: 0 d: 1
b: 0 a: 1
t: 2

Ans: 0 1 2 3 4 5 6 7 8 9
k=3 [3 3 0 _ _ _]
Add new person
Keep the person in front
and the person in front is not
in my window
Ans: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]



2 4 5
3 4 5
2 3 4
2 4 5
3 4 5