

Printer Spooler Problem:

Multiple programs \rightarrow spoolers \rightarrow take elements sequentially \rightarrow Give to printer

I 1) Load $R_i, m[i]$

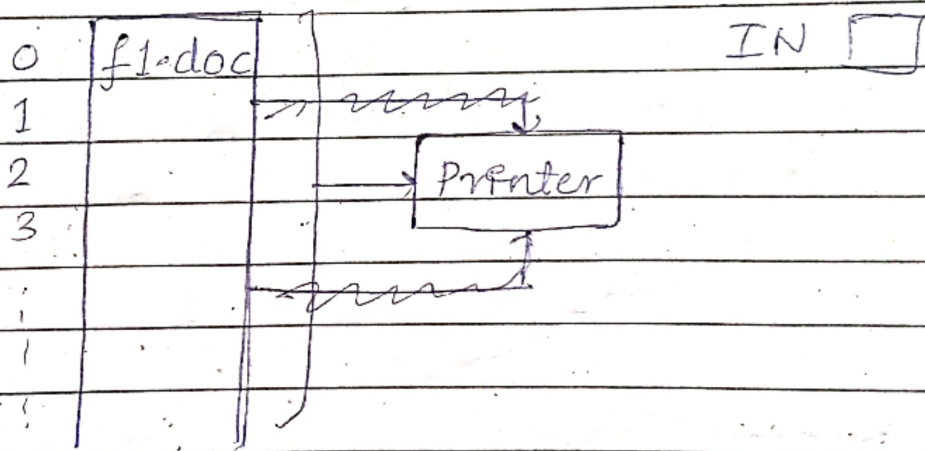
I 2) Store $SD[R_i], "F-N" (f_i.doc)$

I 3) INCR R_i

I 4) Store $m[i], R_i$

To print a document this 4 lines of code must get executed

Spooler Directory



\rightarrow Spooler is a like a program which takes multiple documents from the user & those go to spooler directory & spooler takes the programs one by one & prints it gives it to the printer sequentially & it's printed.

\rightarrow In shows the location of the next item to be loaded in spooler directory.

- In q zero initially
- First we load α mem. addr. of $m[q]$ in R_i
- i.e. α comes in R_i
- We store $f_1.doc$ in $SD[0]$ (SD = spooler dir.)

Spooler Directory

0	$f_1.doc$	In $\boxed{0}$ 1
1		
2		
:		
:		
:		
:		
:		

- We increment R_i from 0 to 1
- Also q gets incremented from 0 to 1
- The printer would take the file from here & print it, the q is the normal case scenario.

Case 2: Let's assume that some files are already present in SD .

SD		
0	$f_1.doc$	Now q is pointing to 3
1	$f_2.doc$	
2	$f_3.doc$	
3	$f_4.doc$	q $\boxed{3}$
4		R_i $\boxed{3}$ 4 4
:		
:		

→ Now say that 2 co-operative processes P_1 & P_2 have arrived.

→ Now P_1 wants to put f1.doc in SD & P_2 wants to put f5.doc in SD, so both share the same code.

→ Let's say that P_1 comes first & executes I_1, I_2, I_3 .

→ i.e. now 3 comes in R_1

→ Stores f4.doc in $SD[3]$

→ R_1 get incremented from 3 to 4

→ It gets pre-empted now & P_2 comes into play

→ P_2 comes into play

→ So as in R_1 not incr. i.e. it's 3

→ 3 comes in R_1

→ & f5.doc gets stored in $SD[3]$, which over-writes f4.doc.

→ R_2 get incremented from 3 to 4

→ & 4 gets stored in R_2 in

→ Now P_2 terminates & P_1 comes

→ Now R_1 has 4 stored in it

→ & R_1 gets overwritten to 4 again

→ Now there is a problem of loss of data as f5.doc over-writes f4.doc

$P_1 I_1 I_2 I_3 I_4$

$P_1 I_1 I_2 I_3 | P_2 I_1 I_2 I_3 I_4 | I_4$

So we need to use semaphores or monitors