6SENG002W Concurrent Programming

FSP Process Analysis & Design Form

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1. FSP Process Attributes

Attribute	Value
Name	PRINTER
Description	A Shared printer that offers the functionality to print upto 3 documents at a given time. The paper refill process will be checked by the technician.
Alphabet	{std1.print, std2.print , std1.printLock, std2.printLock, std1.refill, std2.refill, std1.refillLock, std2.refillLock, std1.release, std2.release, tech.print, tech.printLock, tech.refill, tech.refillLock, tech.release}
Number of States	12
Deadlocks (yes/no)	No
Deadlock Trace(s) (if applicable)	Not applicable

2. FSP Process Code

| FSP Process: PRINTER |
| --- |
| const MAX_SHEETS = 3
range SHEET_RANGE =0..MAX_SHEETS
set PRINTER_ACTIONS = {printLock, print, refillLock, refill, release}
set Users = {std1 , std2, tech}

PRINTER (SHEETS_COUNT = MAX_SHEETS) = PRINTER[SHEETS_COUNT],
PRINTER[a :SHEET_RANGE] =
              if(a > 0)
              then (printLock -> print -> release -> PRINTER[a-1])
              else(refillLock-> refill -> release -> PRINTER[MAX_SHEETS]). |

3. Actions Description

A description of what each of the FSP process' actions represents, i.e. is modelling. In addition, indicate if the action is intended to be synchronised (shared) with another process or asynchronous (not shared). (Add rows as necessary.)

Actions	Represents	Synchronous or Asynchronous
printLock	Pressing "printLock" to gain the mutual exculsive access for the user(student in the scenario)	Synchronous
print	Pressing "print" to print the locked docuement	Synchronous
release	Printer will "release" the lock with printer and student	Synchronous
refillLock	Pressing "refillLock" to lock the printer and the technician	Synchronous
refill	Refill action will refill the printer with maximum sheets	Synchronous

4. FSM/LTS Diagrams of FSP Process

Note that if there are too many states, more than 64, then the LTSA tool will not be able to draw the diagram. In this case draw small diagrams of the most important parts of the complete diagram.
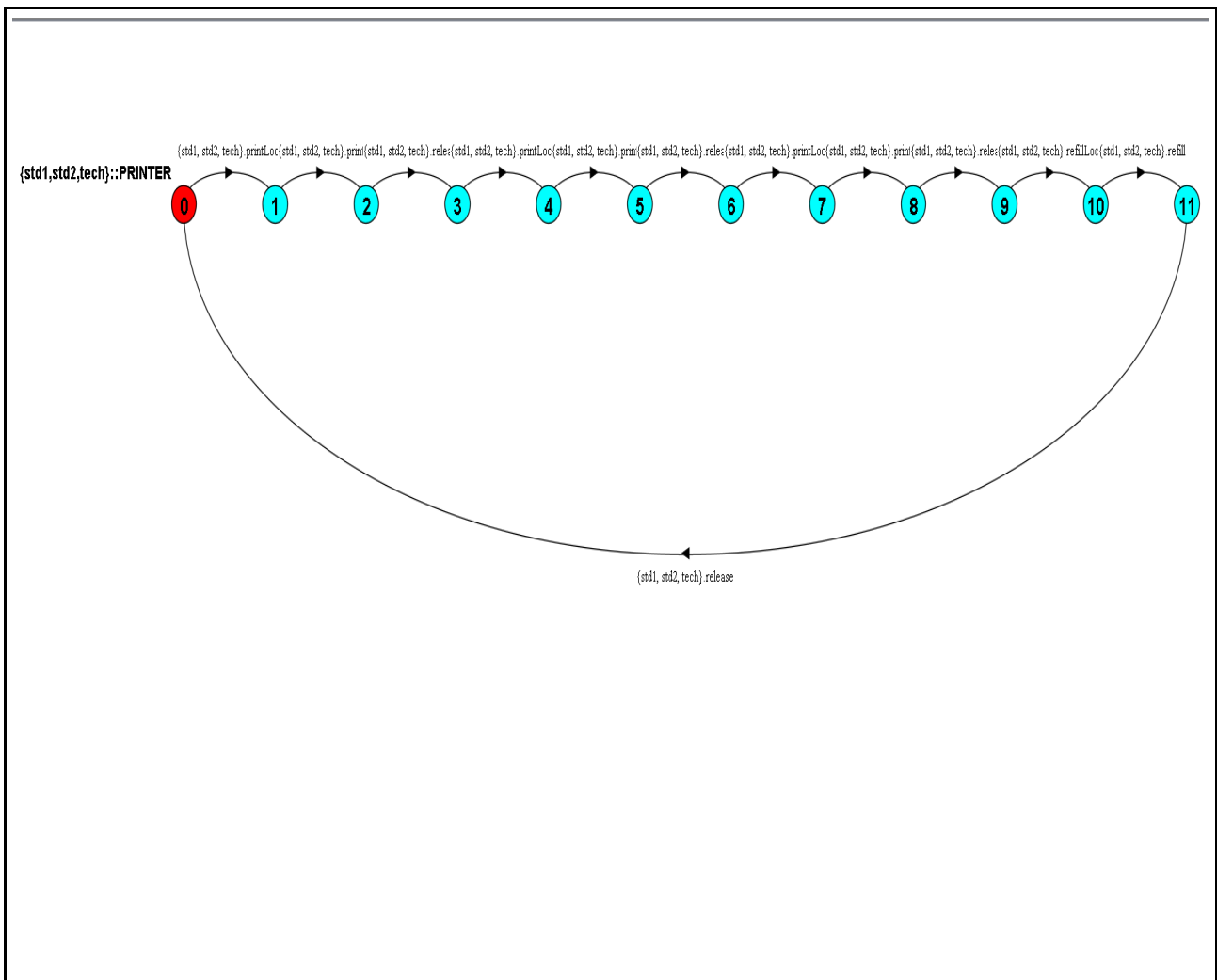
5. LTS States

A description of what each of the FSP process' states represents, i.e. is modelling. If there are a large number of states then you can group similar states together &/or only include the most important ones. For example, identify any states related to mutual exclusion (ME) & the associated critical section (CS), e.g. waiting to enter the CS state, in the CS state(s), left the CS state. (Add rows as necessary.)

State	Represents
0	Printer offeres to lock the printer either student who has 3 documents or student who has 2 documents. And the technician process will be in wait state since the sheets are not empty
1	Selected student will be locked with the printer (to keep the mutual exclusion)
2	Locked student will print its document 1
3	Release the lock with printer and finish the printing first document
4	Selected student will be locked with the printer to print the second document
5	Locked student print the second document
6	Release the lock with printer and finish the printing of second document
7	Selected student will be locked with the printer to print the third document
8	Locked student will print the third document in the printer
9	Release the lock with printer and finish the printing three documents
10	Printer offers lock with technician before refilling
11	Technician refill the printer and release to initial state (0)

6. Trace Tree for FSP Process

PRINTER

●

│ printLock

○

│ print

○

│ release

○

│ printLock

○

│ print

○

│ release

○

│ printLock

○

│ print

○

│ release

○

│ refillLock

○

│ refill

○

│ release

○

△ PRINTER