6SENG002W Concurrent Programming

FSP Process Analysis & Design Form

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1. FSP Process Attributes

Attribute	Value
Name	PRINTER
Description	A printer that can print up to 3 pages without refill.
Alphabet	{student.{acquire, print.paper, release}, technician.{acquire, refill, release}, waiting}
Number of States	13
Deadlocks (yes/no)	No
Deadlock Trace(s)	N/A

2. FSP Process Code

FSP Process:

```
// CONSTANTS
const MAX_PAPER = 3
range PAPER_RANGE = 0 .. MAX_PAPER


// PRINTER FSM
PRINTER (N = MAX_PAPER) = PRINT[N],
PRINT[ papercount : PAPER_RANGE ] = (
      when( papercount > 0)  student.acquire -> student.print.paper ->
student.release -> PRINT[ papercount - 1 ]
      |
      when( papercount == 0 ) technician.acquire -> technician.refill ->
technician.release ->  PRINT[3]
| waiting -> WAIT ),  // Comment as required
WAIT = (waiting -> WAIT // Comment as required
).
```

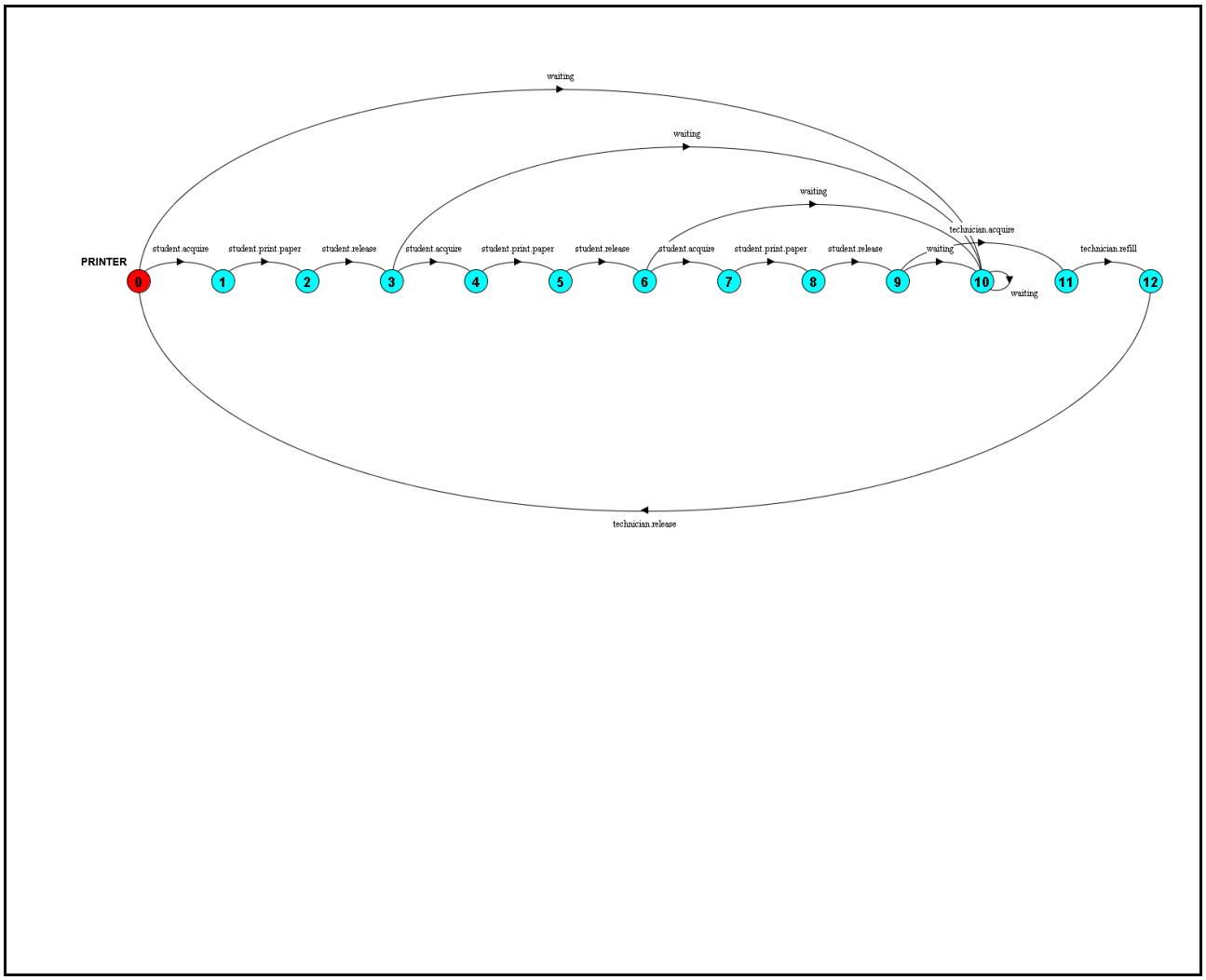
3. Actions Description

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
student.acquire	Student taking control of the printer for printing	synchronous
student.print.paper	Student printing a paper	synchronous
student.release	Student leaving printer after printing job	synchronous
technician.acquire	Technician taking control of the printer for refilling	synchronous
technician.refill	Technician refilling papers of printer	synchronous
technician.release	Technician leaving printer after refilling	synchronous
waiting	Printer waiting for next operation	asynchronous

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.)

States	Represents
0	Printer is ready to be used.
1, 4, 7	A student has taken control of the printer.
2, 5, 8	A printing job has been conducted by the student.
3, 6, 9	Student has released the control and now printer is ready to be used.
10	Printer is waiting for a job input.
11	A technician has taken control of the printer.
12	Technician has refilled the paper and printer is ready to be used.

6. Trace Tree for FSP Process

The trace tree for the process. Use the conventions given in the lecture notes.