

# 6SENG006C Concurrent Programming

## FSP Process Analysis & Design Form

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### 1. FSP Process Attributes

<b>Attribute</b>	<b>Value</b>
<b>Name</b>	PRINTER
<b>Description</b>	This is the basic procedure that simulates how a printer behaves in a printing system. This printer can be used to print up to 3 papers, then must refill.
<b>Alphabet</b>	{student. {acquire, print.paper, release}, technician. {acquire, refill, release}, waiting}
<b>Number of States</b>	13
<b>Deadlocks (yes/no)</b>	No
<b>Deadlock Trace(s) (If applicable)</b>	Not Applicable

## 2. FSP Process Code

### FSP Process:

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

set PRINTER_ACTIONS = { student.acquire , student.print.paper , student.release,
technician.acquire , technician.refill , technician.release }
set Students = { a, b }

// 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
), WAIT = ( waiting -> WAIT ).
```

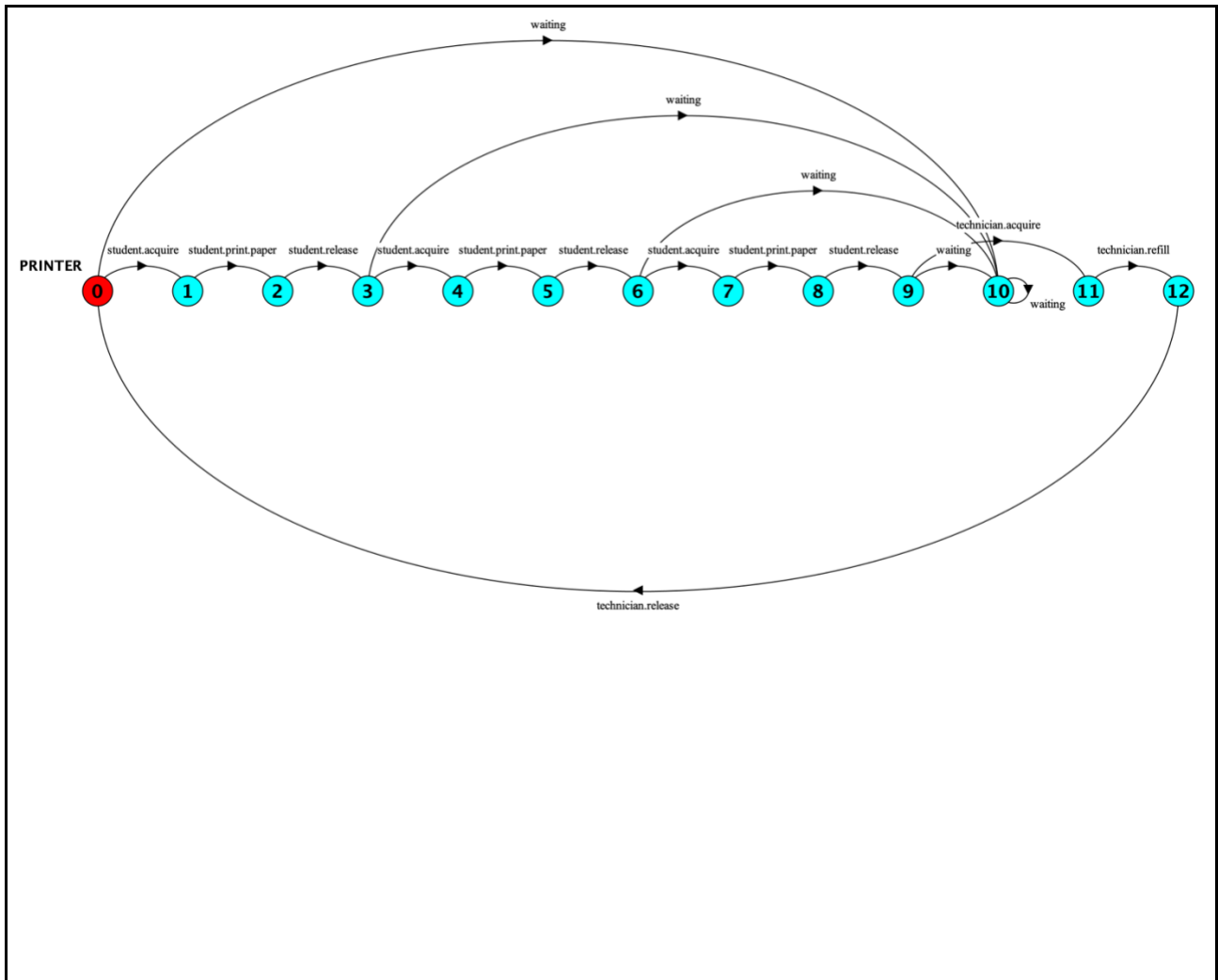
## 3. Actions Description

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	Synchronous
student.print.paper	Student printing a paper	Synchronous
student.release	Student leaving the printer after the completion	Synchronous
technician.acquire	Technician taking control of the printer	Synchronous
technician.refill	Technician refilling papers	Synchronous
technician.release	Technician leaving after refilling papers	Synchronous
waiting	Printer waiting for the 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.)

State	Represents
0	Printer is ready to be used
1, 4, 7	The printer has been taken over by a student
2, 5, 8	The student has a printing job going on
3, 6, 9	The control has been released by the student and the printer is now available for usage
10	The 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 now available for usage

## 6. Trace Tree for FSP Process

The trace tree for the process. Use the conventions given in the lecture notes and add explanatory notes if necessary.

