

6SENG002W Concurrent Programming

FSP Process Composition Analysis & Design Form

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1. FSP Composition Process Attributes

Attribute	Value
Name	PRINTING_SYSTEM
Description	It models a composite process containing a printer, two students and a technician
Alphabet (Use LTSA's compressed notation, if alphabet is large.)	{ {st2, st3}. {acquirePrintDoc, acquireRefill, print, refill, release}, t. { acquirePrintDoc, acquireRefill, print, refill, release, wait} }
Sub-processes (List them.)	PRINTER, STUDENT, TECHNICIAN
Number of States	55
Deadlocks (yes/no)	NO
Deadlock Trace(s) (If applicable)	N/A – NO DEADLOCK

2. FSP "main" Program Code

The code for the parallel composition of all of the sub-processes and the definitions of any constants, ranges & process labelling sets used. (Do not include the code for the other subprocesses.)

FSP Program:

```
const MAX_PAPERSHEETS = 3 // Maximum number of
const MIN_PAPERSHEETS = 1 //Min number of sheets
const MIN_DOCUMENT = 1 //min doc count

set ACTIONS_PRINTER = { acquirePrintDoc, print, acquireRefill, refill, release }

|| PRINTING_SYSTEM = (st3: STUDENT(3) || st2: STUDENT(2) || t: TECHNICIAN || {st3, st2,
t} :: PRINTER) .
```

3. Combined Sub-processes

(Add rows as necessary.)

Process	Description
STUDENT	This sub-process represents of a student who wants to acquire the printer and print documents using it.
TECHNICIAN	This sub-process represents of a technician who wants to acquire the printer and refill the number of sheets.
PRINTER	This sub-process represents of a printer resource which provides facilities to print documents.

4. Analysis of Combined Process Actions

- **Synchronous** actions are performed by at least two sub-process in the combination.
- **Blocked Synchronous** actions cannot be performed, since at least one of the subprocesses cannot perform them, because they were added to their alphabet using alphabet extension.
- **Asynchronous** actions are performed independently by a single sub-process.

Group actions together if appropriate, for example if they include indexes, e.g. in[0], in[1], ..., in[5] as in[1..5].

(Add rows as necessary.)

Synchronous Actions	Synchronised by Sub-Processes (List)
st2.acquirePrintDoc, st3.acquirePrintDoc st2.print, st3.print	STUDENT, PRINTER
st3.release, st2.release, t.release	TECHNICIAN, STUDENT, PRINTER
t.acquireRefill, t.refill	TECHNICIAN , PRINTER

Blocked Synchronous Actions	Synchronizing sub process(List)	Blocking sub-Processes
st3.acquireRefill, st3.refill, st2.acquireRefill, st2.refill	STUDENT, PRINTER	STUDENT
t.acquirePrintDoc, t.print	TECHNICIAN , PRINTER	TECHNICIAN

Sub-Process	Asynchronous Actions (List)
STUDENT	N/A
PRINTER	N/A

TECHNICIAN	t.wait
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5. Parallel Composition Structure Diagram : shown below

The structure diagram for the parallel composition.

