

# 6SENG006C.1 Concurrent Programming

## FSP Process Analysis & Design Form

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### 1. FSP Process Attributes

<b>Attribute</b>	<b>Value</b>
<b>Name</b>	TICKET_MACHINE
<b>Description</b>	Represents the ticket machine, which can be used to print ticket.
<b>Alphabet</b>	firstPassenger.(accessRefillPaperOption, accessRefillTonerOption, issueTicket, obtainMachine, refillPaper, refillToner, release, releaseRefillPaper, releaseRefillToner)  secondPassenger.(accessRefillPaperOption, accessRefillTonerOption, issueTicket, obtainMachine, refillPaper, refillToner, release, releaseRefillPaper, releaseRefillToner)  ticketTechnician.(accessRefillPaperOption, accessRefillTonerOption, issueTicket, obtainMachine, refillPaper, refillToner, releaseRefillPaper, releaseRefillToner)  tonerTechnician.(accessRefillPaperOption, accessRefillTonerOption, issueTicket, obtainMachine, refillPaper, refillToner, release, releaseRefillPaper, releaseRefillToner)
<b>Number of States</b>	15
<b>Deadlocks (yes/no)</b>	No deadlocks/errors
<b>Deadlock Trace(s) (if applicable)</b>	N / A

## 2. FSP Process Code

<b>FSP Process:</b>
<pre> const MAXIMUM_PAPER = 3 range PAPER_RANGE = 0..MAXIMUM_PAPER  const MAXIMUM_TONER = 3 range TONER_RANGE = 0..MAXIMUM_TONER  set MACHINE_ACTIONS = { obtainMachine, issueTicket, release, accessRefillTonerOption, refillToner, releaseRefillToner, accessRefillPaperOption, refillPaper, releaseRefillPaper}  TICKET_MACHINE(PAPER_COUNT = MAXIMUM_PAPER, TONER_COUNT = MAXIMUM_TONER) = TICKET_MACHINE[MAXIMUM_PAPER][MAXIMUM_TONER], TICKET_MACHINE[p : PAPER_RANGE][t : TONER_RANGE] =   if (p &gt;= 1 &amp; t &gt;= 1)     then (obtainMachine -&gt; issueTicket -&gt; release -&gt; TICKET_MACHINE[p - 1][t - 1])     else (accessRefillPaperOption -&gt; refillPaper -&gt; releaseRefillPaper -&gt; accessRefillTonerOption -&gt; refillToner -&gt; releaseRefillToner -&gt; TICKET_MACHINE[MAXIMUM_PAPER][MAXIMUM_TONER]) + MACHINE_ACTIONS . </pre>

## 3. Actions Description

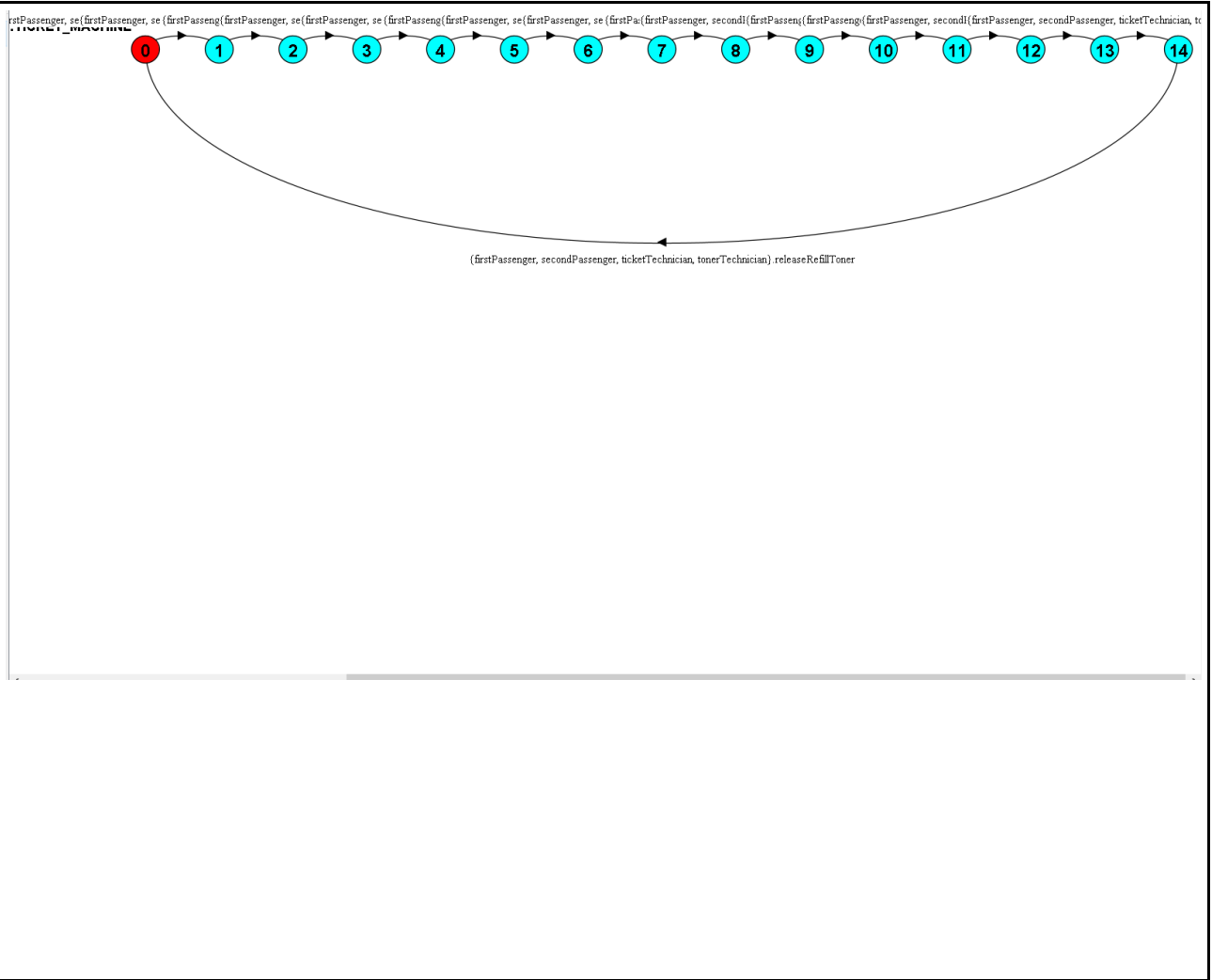
A description of what each of the FSP process' actions represents, i.e. is modelling. In addition, indicate if the action is intended to be synchronised (shared) with another process or asynchronous (not shared). (Add rows as necessary.)

<b>Actions</b>	<b>Represents</b>	<b>Synchronous or Asynchronous</b>
getMachine	Ticket print machine will be used by passenger or technician	Synchronous
obtainTicket	Ticket print machine obtain the ticket	Synchronous
END	Ending the process after printing	Asynchronous
release	Ticket Print machine release	Synchronous
accessRefillToner	Access the Ticket machine to refill toner	Synchronous
refillTonerProcess	Refill the toner Ticket Machine	Synchronous
releaseRefillTonerProcess	Release the refill the toner process	Synchronous
accessRefillPaper	Access the Ticket machine to refill paper	Synchronous
refillPaperProcess	Refill the paper Ticket Machine	Synchronous

releaseRefillPaperProcess	Release the refill the paper process	Synchronous
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#### 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, 3, 6	Passenger, Ticket technician or Toner technician has acquired ticket machine
9, 10, 11, 12, 13, 14	Passenger, Ticket technician or Toner technician has released the ticket machine
1, 4, 7	Passengers print the ticket
2, 5, 8	Release the Ticket Machine

## 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.

