**6SENG002W Concurrent Programming**

**FSP Process Composition Analysis & Design Form**

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| **Name** | H.K.J.N.Gunaweera |
| **Student ID** | IIT-20200003 UOW-w1810567 |
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**1. FSP Composition Process Attributes**

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| **Attribute** | **Value** |
| **Name** | TICKETING\_SYSTEM |
| **Description** | This depicts a composite process model for a ticketing system, encompassing two passenger processes and a technician process. |
| **Alphabet**  (Use LTSA's compressed notation, if alphabet is large.) | {{p2, p3}.{acquirePrint, acquireRefill, print, refill, release}, t.{acquirePrint, acquireRefill, print, refill, release, wait}} |
| **Sub-processes**  (List them.) | TICKET\_MACHINE, p1: PASSENGER, p2: PASSENGER, TECHNICIAN |
| **Number of States** | 55 |
| **Deadlocks**  (yes/no) | No |
| **Deadlock Trace(s)**  **(If applicable)** | Not applicable |

**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 sub-processes.)

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| **FSP Program:** |
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**3. Combined Sub-processes**

(Add rows as necessary.)

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| **Process** | **Description** |
| P2: PASSENGER | This sub-process models the behaviour of a passenger who uses the ticket machine to print ticket documents. This instance of a passenger process is wished to print 3 ticket documents. |
| P3: PASSENGER | This sub-process models the behaviour of a passenger who uses the ticket machine to print ticket documents. This instance of a passenger process is wished to print 3 ticket documents. |
| TECHNICIAN | This sub-process models the behaviour of a technician who refills the printer with paper when it needs to be refilled. |
| TICKET\_MACHINE | This sub process models the behaviour of the ticket machine. |

**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 sub-processes cannot perform them, because they were added to their alphabet using alphabet extension.
* **Asynchronous** actions are preformed 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].

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| **Synchronous Actions** | **Synchronised by Sub-Processes (List)** |
| p2.acquirePrint, p2.print | P2:PASSENGER(2), TICKET\_MACHINE |
| p3.acquirePrint, p3.print | P3:PASSENGER(3), TICKET\_MACHINE |
| p2.release, t.release | t:TECHNICIAN, P3:PASSENGER(3), TICKET\_MACHINE |
| p3.release, t.release | t:TECHNICIAN, P2:PASSENGER(2), TICKET\_MACHINE |
| t.acquireRefil, t.refill | t:TECHNICIAN,TICKET\_MACHINE |

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| **Blocked Synchronous Actions** | **Synchronizing Sub process (List)** | **Blocking sub-process** |
| p2.acquireRefill, p2.refill | P2: PASSENGER (2), TICKET\_MACHINE | P2: PASSENGER (2) |
| p3.acquireRefil, p3.refill | P3: PASSENGER (3), TICKET\_MACHINE | P3: PASSENGER (3) |
| t.acquirePrint, t.print | t.TECHNICIAN, TICKET\_MACHINE | t.TECHNICIAN |

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| **Sub-Process** | **Asynchronous Actions (List)** |
| P2: PASSENGER (2) | Not applicable |
| P3: PASSENGER (3) | Not applicable |
| TICKET\_MACHINE | Not applicable |
| t.TECHNICIAN | t.wait |

**5. Parallel Composition Structure Diagram**

The structure diagram for the parallel composition.

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| A black and white diagram of a ticketing system  Description automatically generated |