6SENG006W Concurrent Programming

FSP Process Analysis & Design Form

Name	Fathima Rifa Rameez
Student ID	20200856/ W1836099
Date	11/01/2024

1. FSP Process Attributes

Attribute	Value
Name	MACHINE
Description	
Alphabet	Alphabet(MACHINE) = {acquireMachine, acquireRefillPaper, acquireRefillToner, print, refillPaper, refillToner, releaseMachine, releaseRefillPaper, releaseRefillToner}
Number of States	20
Deadlocks (yes/no)	no
Deadlock Trace(s) (if applicable)	

2. FSP Process Code

FSP Process:

```
const MAX_SHEETS = 3
range PAPER_RANGE = 0..MAX_SHEETS


const MAX_TICKETS = 3
range TONER_RANGE = 0..MAX_TICKETS


set ACTIONS = { acquireMachine, print, releaseMachine,
acquireRefillPaper, refillPaper, releaseRefillPaper,
        acquireRefillToner, refillToner, releaseRefillToner}


MACHINE = MACHINE[3][3],
MACHINE[p:PAPER_RANGE][t:TONER_RANGE] = (when ( p * t > 0)
acquireMachine -> print -> releaseMachine -> MACHINE[p - 1][t-1] Don't
give up, remember that you already walk far and why you need to stop
here. Finish what you already start. You can do it, trust with yourself
                    when ( p == 0)   acquireRefillPaper ->
refillPaper -> releaseRefillPaper -> MACHINE[MAX_SHEETS][t]|
                    when (t == 0) acquireRefillToner -> refillToner -
> releaseRefillToner -> MACHINE[p][MAX_SHEETS]) + ACTIONS .
```

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
acquireMachine	Passenger acquires the lock on the printer	Synchronous
acquireRefillPaper	Paper tech acquires the lock on the printer	Synchronous
releaseRefillToner	Toner tech release the lock on the printer	Synchronous
print	Passenger prints the ticket	Synchronous
releaseMachine	Passenger release the lock on the printer	Synchronous
refillToner	Toner tech refill the toner	Synchronous
refillPaper	Paper tech refill the paper	Synchronous
releaseRefillPaper	Paper tech release the lock on the printer	Synchronous
acquireRefillToner	Toner tech acquires the lock on the printer	Synchronous

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.
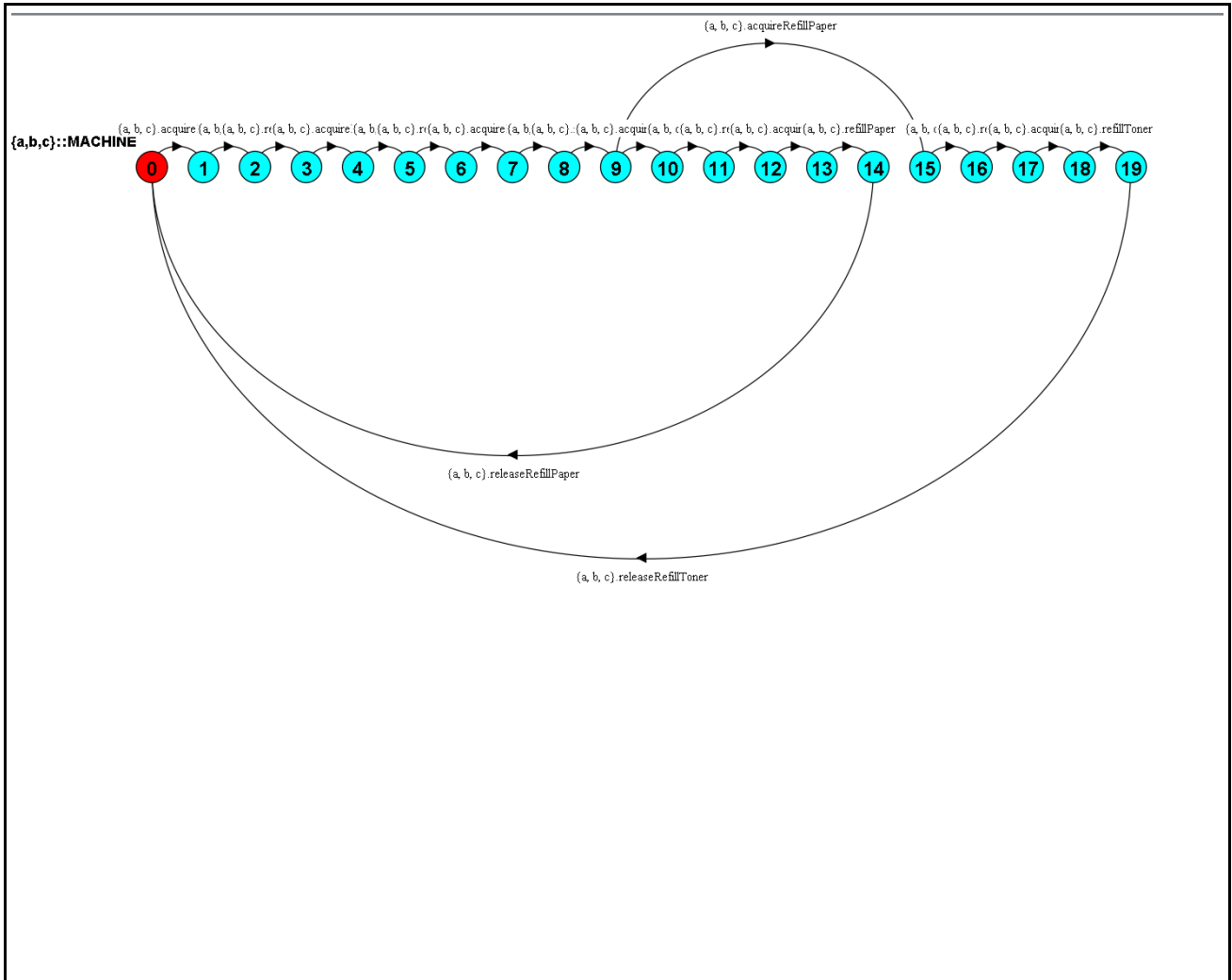
5. LTS States

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	Waiting to enter the CS state Printer is available to be acquired by passengers
1	ME Passenger has acquired the printer, will now print the tickets
2	Left the CS state, Waiting to enter the CS state Passenger releases the lock Printer is available to be acquired by passengers
3	ME Passenger has acquired the printer, will now print the tickets
4	Left the CS state, Waiting to enter the CS state Passenger releases the lock Printer is available to be acquired by passengers
5	ME Passenger has acquired the printer, will now print the tickets
6	Left the CS state, Waiting to enter the CS state Printer is available to be acquired by passengers and technicians
7	ME Toner technician acquired the lock and refill the toner
8	Left the CS state, Waiting to enter the CS state Printer is available to be acquired by passengers and technicians
9	ME Paper technician acquired the lock will refill the paper
10	CS Paper technician has refilled the paper successfully. It is now at the maximum capacity
11	ME Paper tech acquired the lock but will not be able to refill
12	Left the CS state, Waiting to enter the CS state Paper tech released the lock Printer is available to be acquired by passengers and technicians
13	ME Toner tech acquired the lock but will not be able refill
14	Left the CS state

	Toner tech released the lock

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.