CS2310 Quiz 1 (Oct 13, Tuesday, 4pm to 4:45pm)

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Name: Mengsi Lou.

(1) An on-line bookstore has a web site which can interact with other on-line bookstores' web sites. Let us say we have three bookstores' web sites B1, B2 and B3. A customer can browse the web page B1 and select a book. A message is sent to other bookstores B1, B2 and B3, which respond if they carry the book and the price. Notice the message is also sent to B1 itself, so that it can respond. Upon reception of the messages from B1, B2 and B3, or after the expiration of certain time T (because perhaps not all bookstores will respond in time), the least expensive book is selected, and a message is sent to that bookstore to reserve the book. A bookstore, upon reception of a reservation, will put that book on hold for the customer, and send back to the originating bookstore an acknowledgement message. At this time, the resulting book is displayed on the web page of B1 for the customer to purchase. This protocol could go on but we will stop here for simplicity.

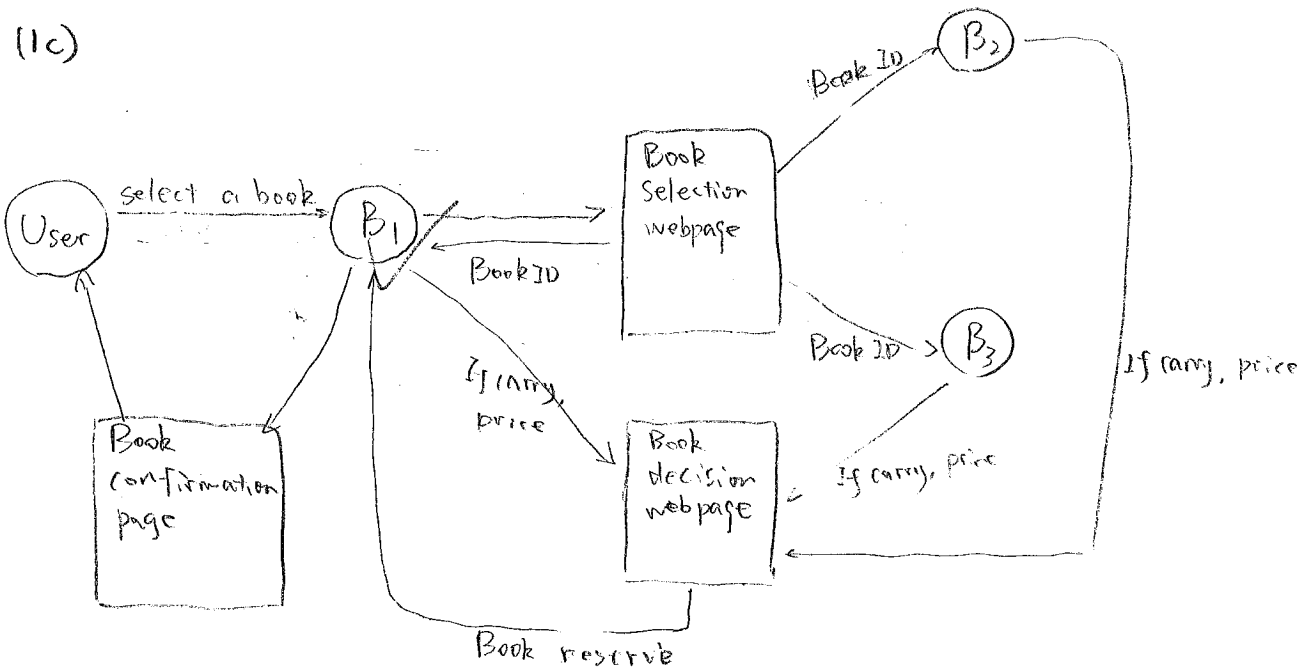
(1a) @(1 point) Draw state-transition diagram to define graphically the index cell type associated with the electronic bookstores' web page.

(1b) @(1 point) Specify this index cell type formally using mathematical notations ic = (X, Y, S, so, A, tmax, f, g).

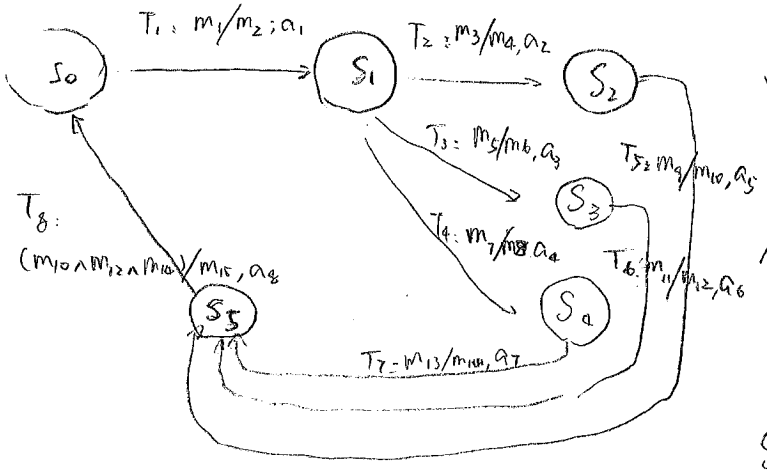
(1c) @(1 point) Draw a diagram showing B1, B2 and B3 enhanced with the index cells to illustrate how these index cells work together to form an active index system.

(2) @(2 points) The Petri net is defined as follows: I(t1) = {p1, p2}, O(t1) = {p2}, I(t2) = {p2, p3} and O(t2) = {p2}, where I(t1) is the set of input place(s) for transition t1, and O(t1) is the set of output place(s) for transition t1. The initial marking, i.e., the initial token distribution, is (1, 1, 1). What is the marking (token distribution) after two firings?

(1c)



Selection Manager. $(X, Y, S, S_0, A, t_{max}, f, g)$.



X: m_1: User input message
m_3, m_5, m_6: Book stores reply
m_9, m_{10}, m_{13}: Book price

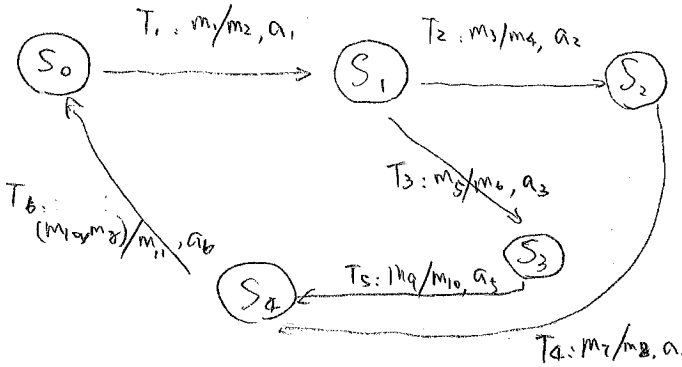
Y: m_2: start selection
m_4, m_6, m_8: Book prices
m_{10} m_{12} m_{14}: choose book or not
m_{15}: take which book

A: a_1: Send book ID to all book stores.
a_2 a_3 a_4: select the book or not
a_5 a_6 a_7: send msg to S_5
a_8: send confirm to book Store

S: S_0: sleep
S_1: selecting
$S_2, S_3 S_4$: handle book price from S_5: make decision

t_{max}: maximum waiting time for T_2 T_3 T_4.

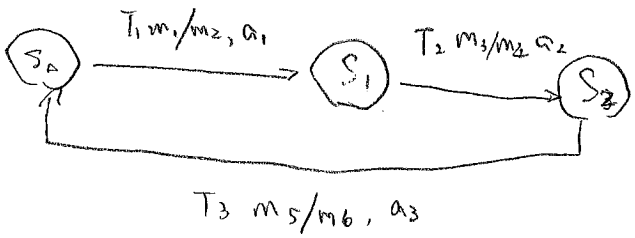
Searching manager $(X, Y, S, S_0, A, t_{max}, f, g)$.



X: m_1: Book selection with book ID
m_3: ~~find~~ finish searching
m_5: time expired
m_9: get decision
Y: m_2:
m_4: find the book with price or cannot find the book
m_6: cannot find book
A: a_1: Start search.
a_2: make decision
a_3: stop searching
a_4: send price
a_5: send search failed
S: S_0: sleep
S_1: searching a book
S_2: find out the book or not
S_3: time expired
S_4: result to reply B_1

m_{10}: cannot find book.
m_8: find book with price
m_{11}: book with price
a_6: send result to B_1

Reserver manager.

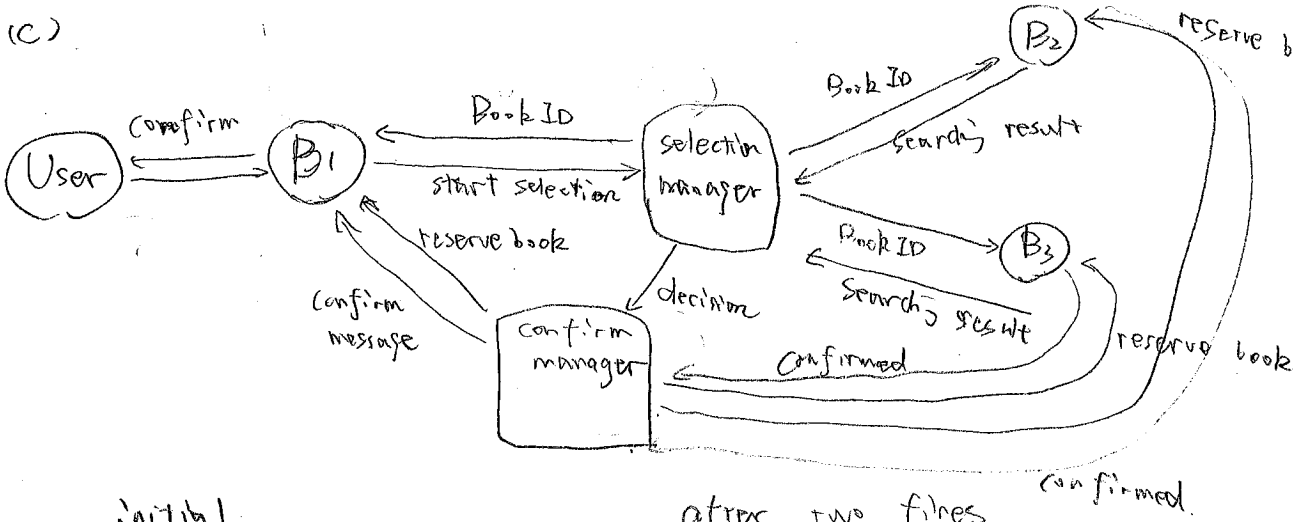


a_1: send reserve msg.
a_2: ~~get~~ reserve confirm
a_3: send confirm msg.

S: S_0: sleep
S_1: send confirm message
S_2: get confirmed.

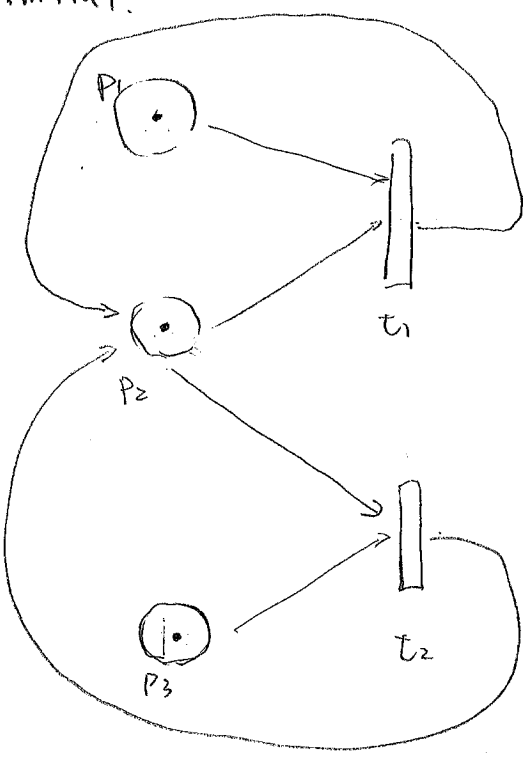
X: m_1: decision about book.
m_3: receive confirm
m_5: confirm msg.
m_2: start send
m_4: get confirmed
m_6: send confirm

(c)

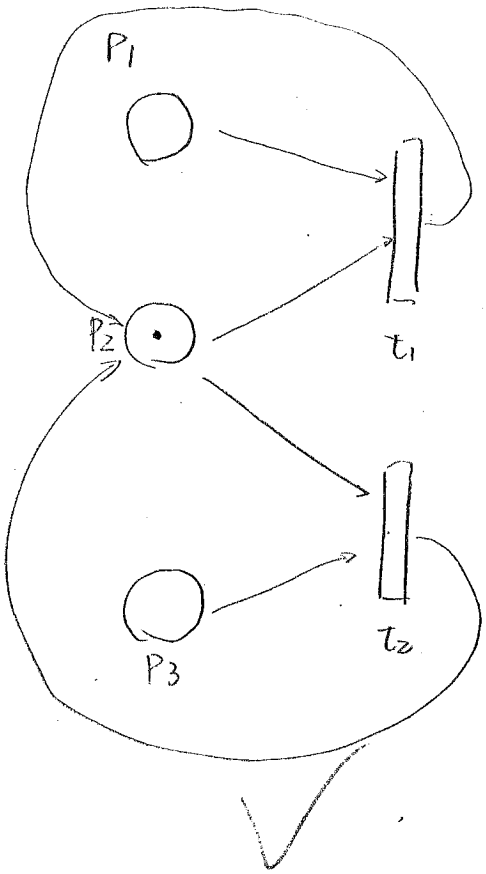


(d).

initial.



after two fires



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