W04 Feb 05 (D4) Music box: ASMD chart analysis

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All Sections

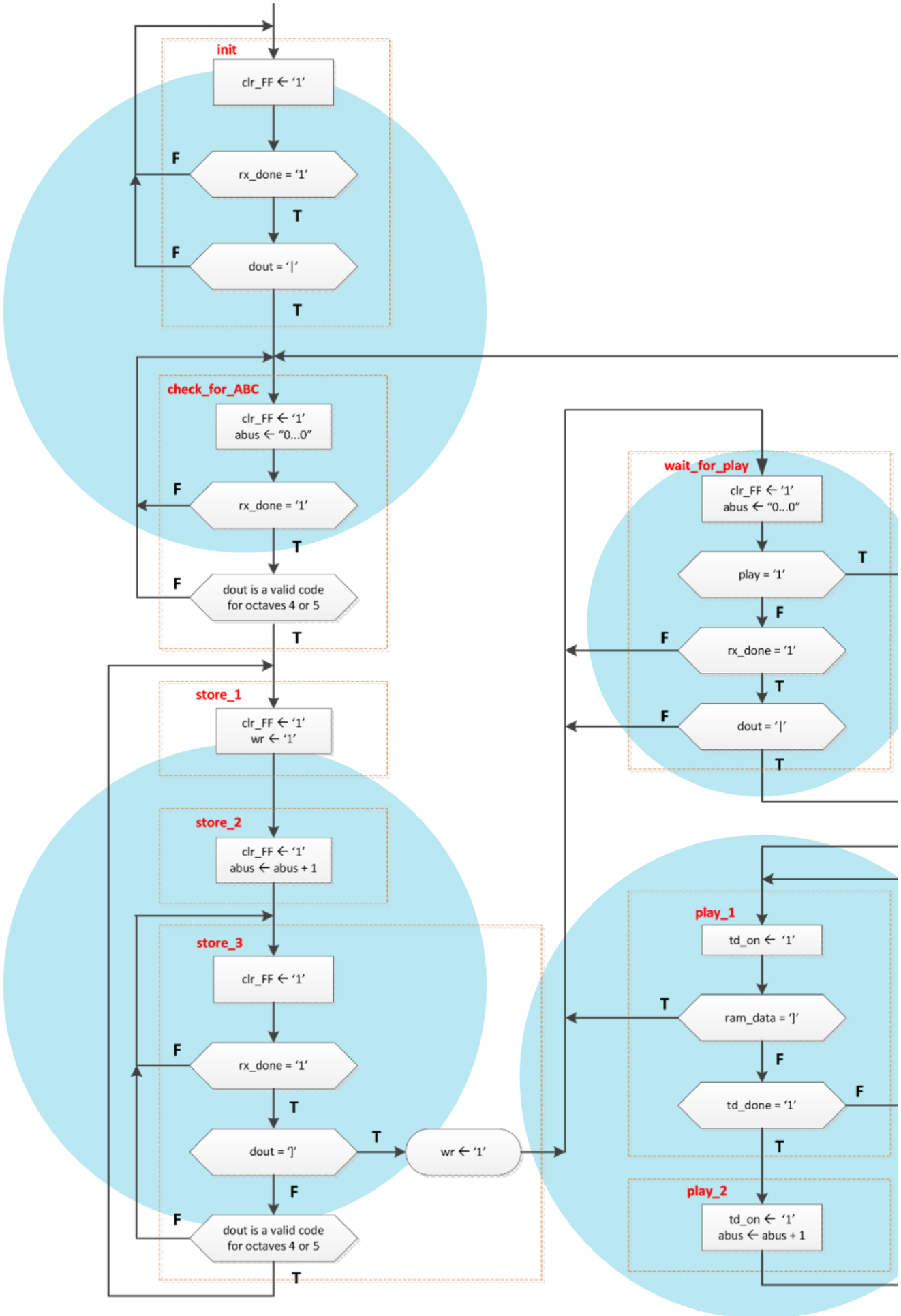
3

These questions are presented under the following assumptions:

- They may be selected to be part of the final exam
- Responses must be posted by the students (not me)
- I will call your attention to any mistakes or wrong content posted in response

The ASMD chart shown below represents one possible solution to a music box with the following characteristics:

- The melody to be played is stored in RAM as a sequence of ASCII codes
- All ASCII codes to be stored in RAM are received serially via RS-232C
- Each musical note belonging to octaves 4 or 5 is represented by one ASCII code
- Specific codes are used to mark the start-of-melody (“|”) and end-of-melody (“]”)
- The melody stored in RAM will be played when a Play button is pushed


init
clr_FF ← '1'
rx_done = '1'
F
T
dout = '|'
check_for_ABC
clr_FF ← '1'
abus ← "0...0"
rx_done = '1'
dout is a valid code
for octaves 4 or 5
store_1
clr_FF ← '1'
wr ← '1'
store_2
clr_FF ← '1'
abus ← abus + 1
store_3
clr_FF ← '1'
rx_done = '1'
dout = ']'
wr ← '1'
dout is a valid code
for octaves 4 or 5
wait_for_play
clr_FF ← '1'
abus ← "0...0"
play = '1'
rx_done = '1'
dout = '|'
play_1
td_on ← '1'
ram_data = ']'
td_done = '1'
play_2
td_on ← '1'
abus ← abus + 1

1. Would it be possible to merge the first two states (“init” and “check_for_ABC”), by moving the abus <= “0...0” statement to the state box of the “init” state, and the decision box of “check_for_ABC” into that same state? Draw the resulting new state if yes, or explain why if no.
2. Can we initiate the reception of a new melody (sequence of ASCII codes) while the current melody is being played? If your answer is no, how would you modify the ASMD chart in order to enable it?
3. If a user makes a mistake when typing a sequence of keys (musical notes), he/she might want to restart by pressing the start-of-melody key (“|”), and beginning the sequence again. Will happen in such a case, according to the ASMD chart shown above? How would you modify the ASMD chart in order to enable this feature?
4. Will we be able to listen to the melody being downloaded as each new ASCII code is received, according to the ASMD chart shown above? How would this be possible, if your answer is no?

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