CS2310 Exercise 3:

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The purpose of this exercise is to understand the relationship between active index and Petri nets. Both are tools for the modeling of distributed multimedia systems. Active index cells are added incrementally to build a dynamic index, and the connections can also change dynamically. However, if the massages passed between index cells are deterministically routed, then it is possible to convert active index into a Petri net. Otherwise you must use a Petri net with conditions (predicates) associated with the transitions, or an Evaluation Net (E-net).

(a) Convert the active index you constructed in Exercise #2 into a Petri net (or an E-net).

Gesture recognition index cell

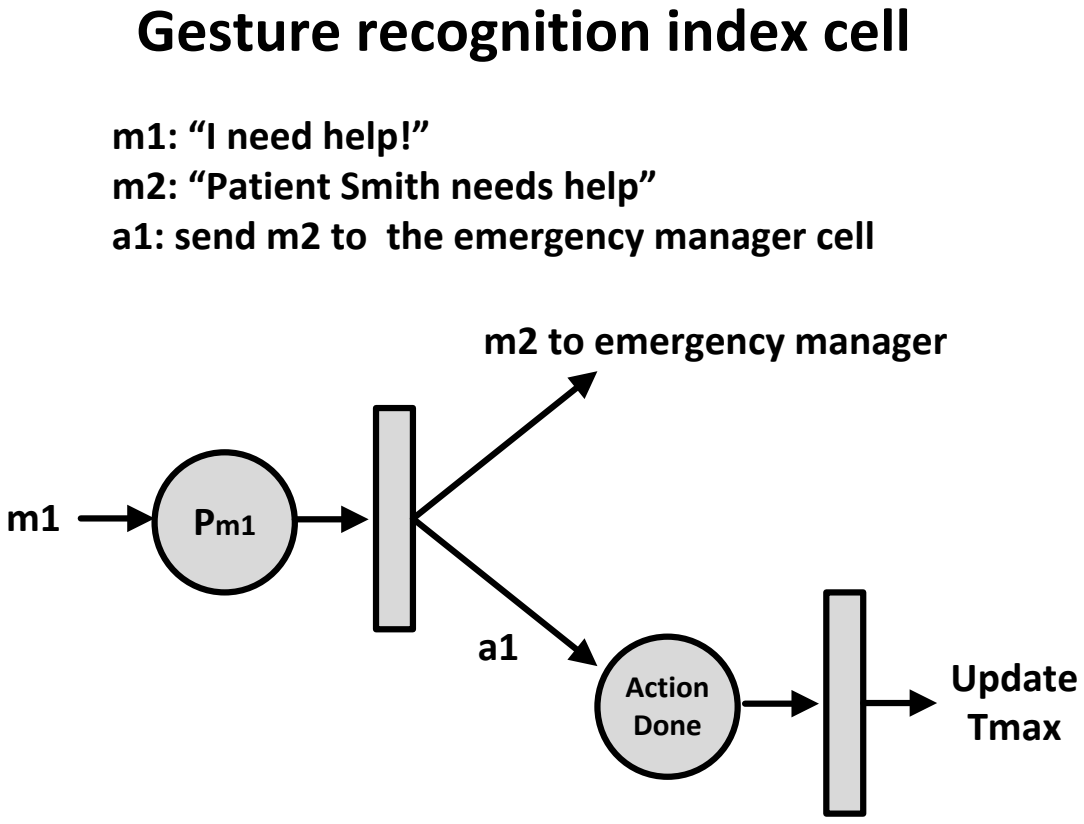


Figure 1. Gesture recognition petri-net diagram

Emergency manager index cell

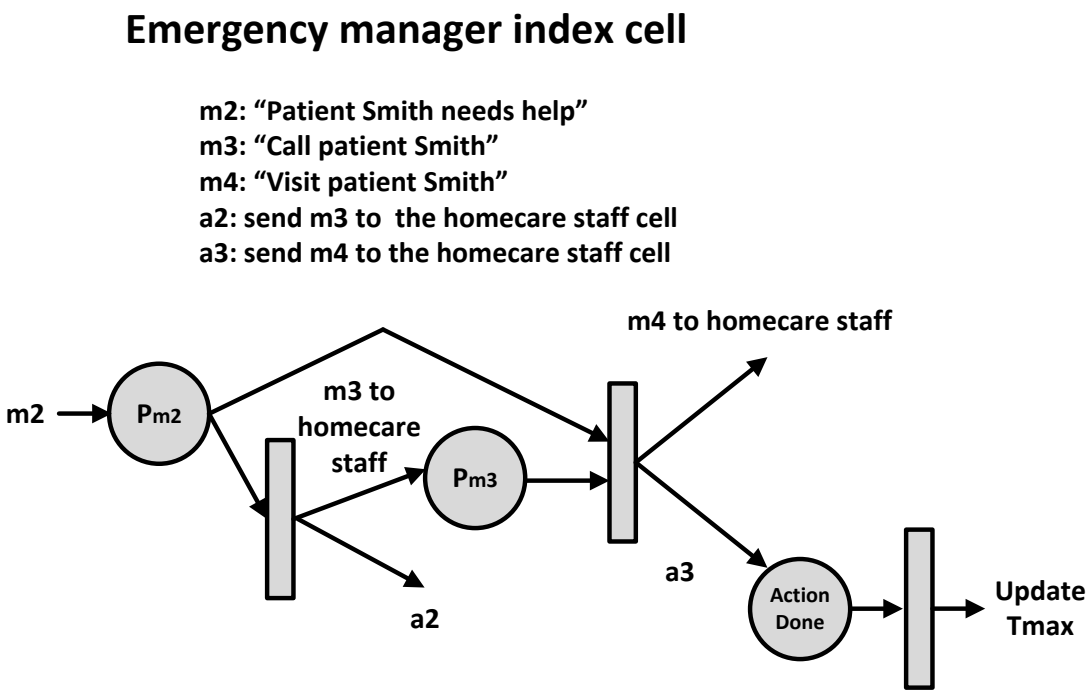


Figure 2. Emergency manager petri-net diagram

Homecare staff index cell

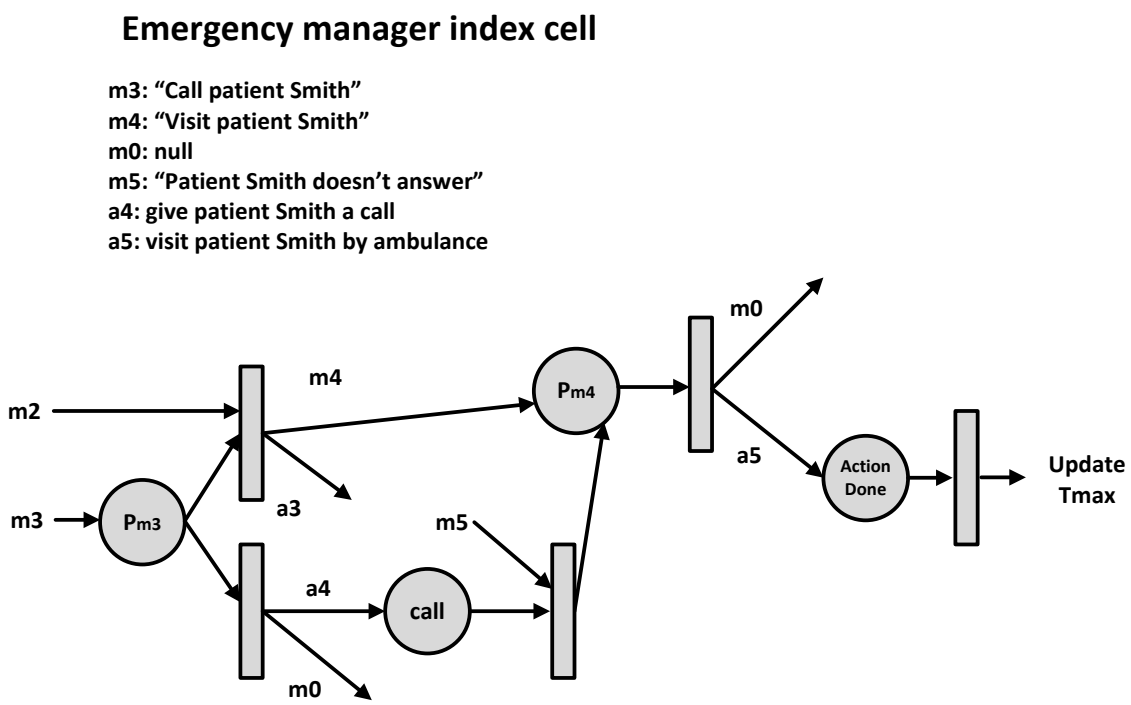


Figure 3. Homecare staff petri-net diagram

(b) Take the diagram you drew in part (c) of Exercise #2. Redraw it here (because you may want to make some changes), and now use the marked Petri net to illustrate the scenario. You can draw a sequence of marked Petri net to show how the system works.

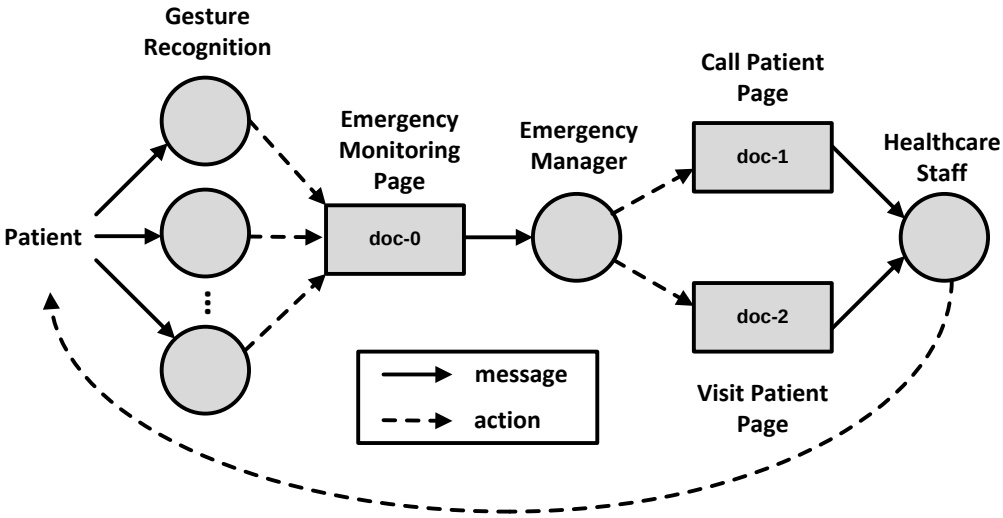


Figure 4. Overview of communication between Gesture Recognition, Emergency Manager and Healthcare Staff

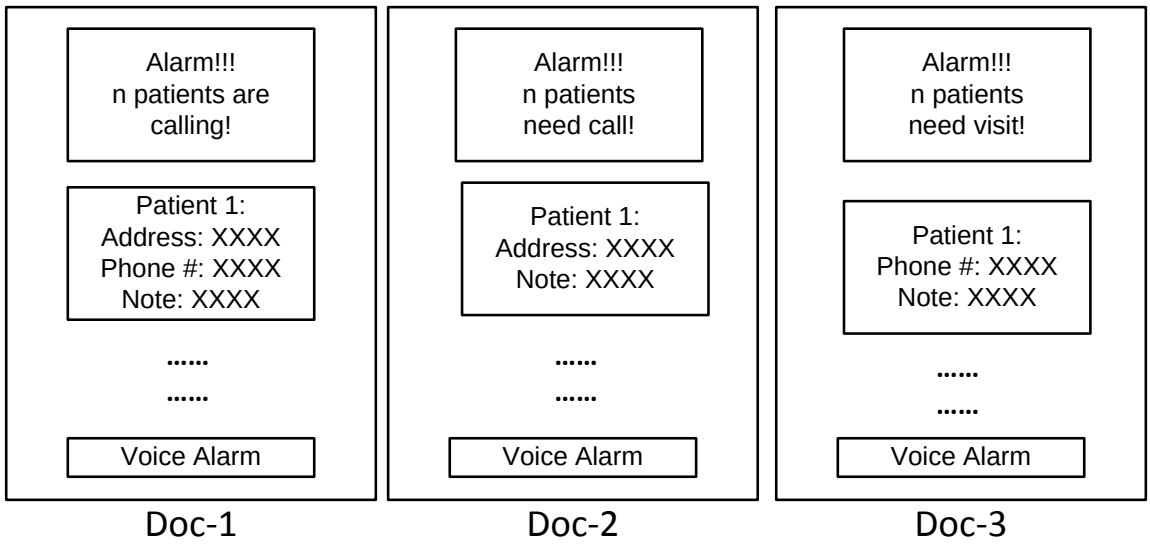


Figure 5. Details of 3 docs

m0: null

m1: “I need help!”

m2: “Patient Smith needs help”

m3: “Call patient Smith”

m4: “Visit patient Smith”

m5: “Patient Smith doesn’t answer”

a1: send m2 to the emergency manager cell

a2: send m3 to the homecare staff cell

a3: send m4 to the homecare staff cell

a4: give patient Smith a call

a5: visit patient Smith by ambulance

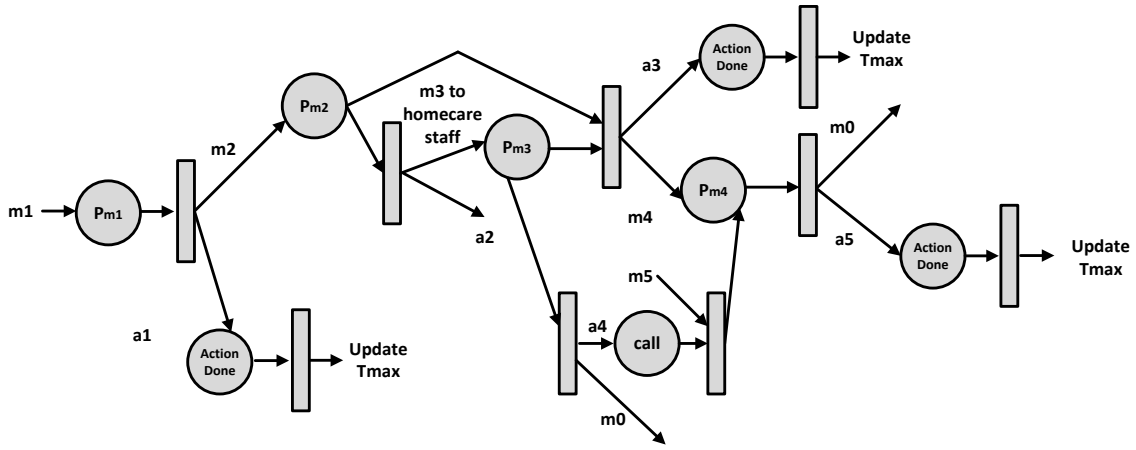
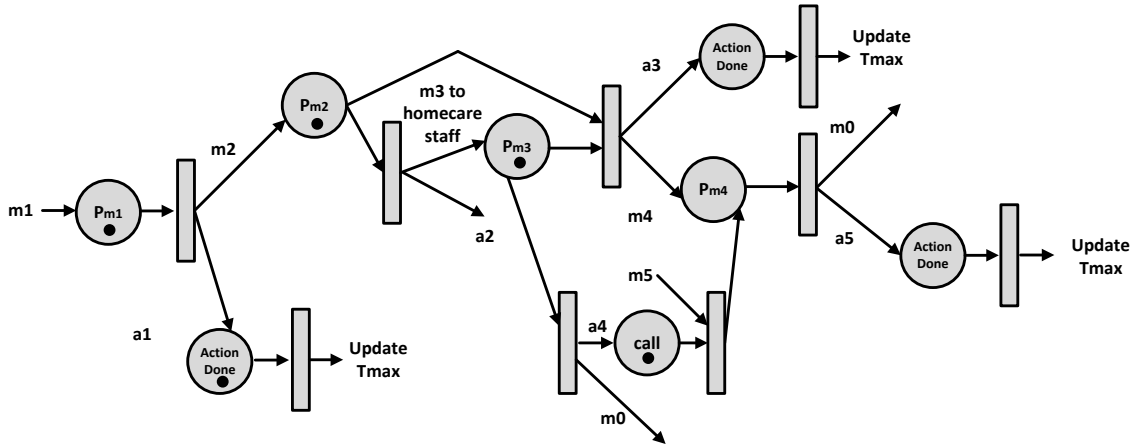
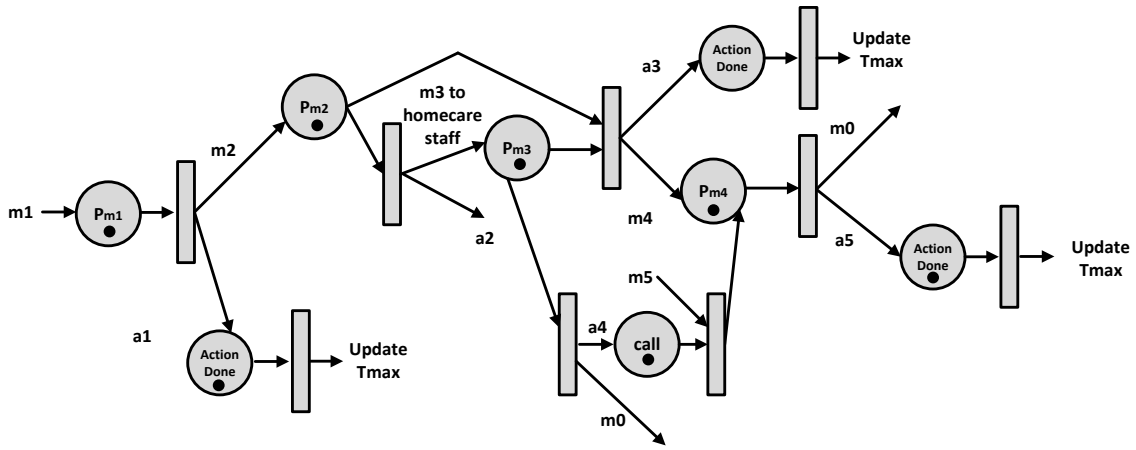


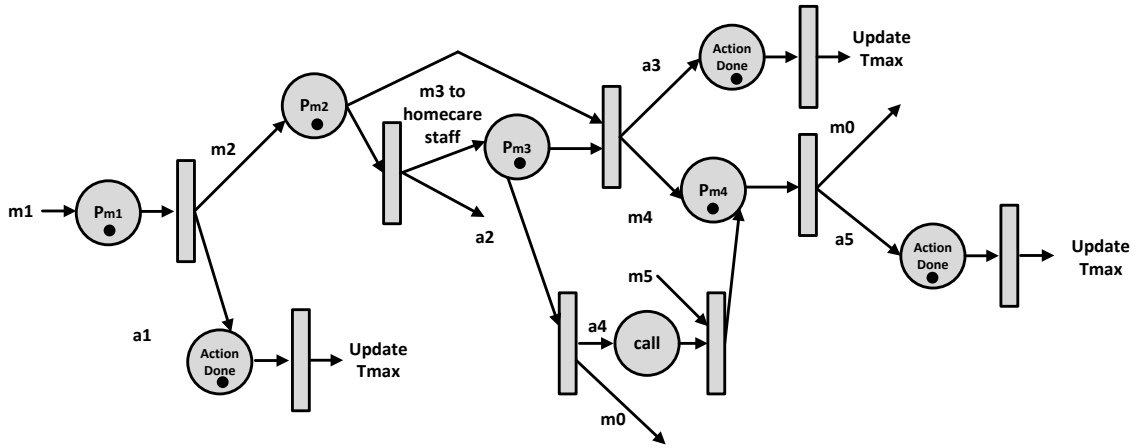
Figure 6. Petri-net for all



Patient sends help message -> Emergency manager sends call patient message -> homecare staff calls patient



Patient sends help message -> Emergency manager sends call patient message -> Homecare staff calls patient -> Patient does not answer -> Homecare staff visits patient



Patient sends help message -> Emergency manager sends call patient message -> Patient sends help message again -> Emergency manager sends visit patient message -> Homecare staff visits patient

(c) Suppose the emergency manager index cell corresponds to a super-component, i.e., the emergency manager can enumerate a number of feasible solutions and select the most appropriate one. Draw the personal health care system as a pair of (I-card, C-card), and convert it into an ordinary Petri net. (To do that, you need to assume a specific number of feasible solutions for the emergency manager to evaluate. Let us say three.) (Note: part (c) was added in 2011)

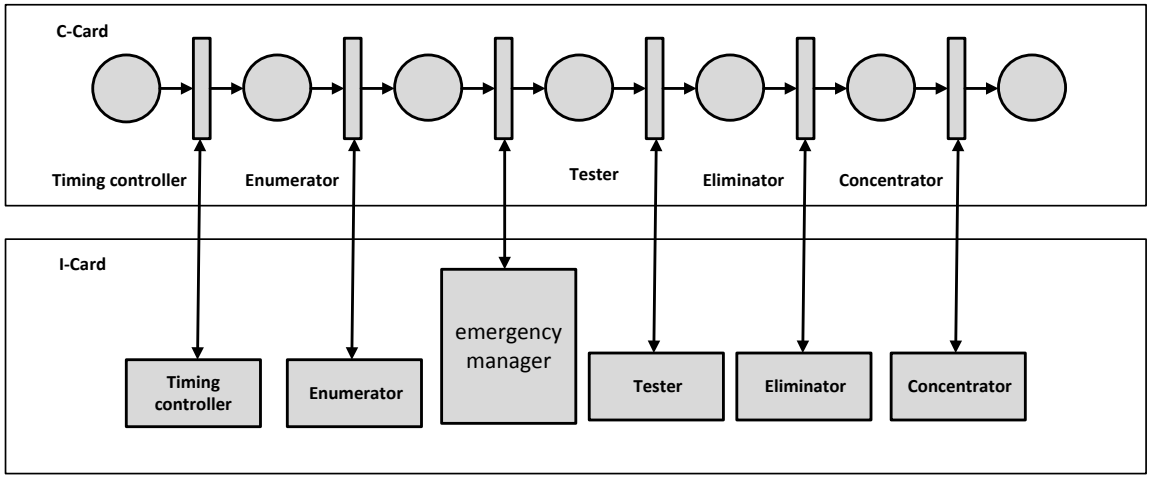


Figure 6. C-Card and I-Card

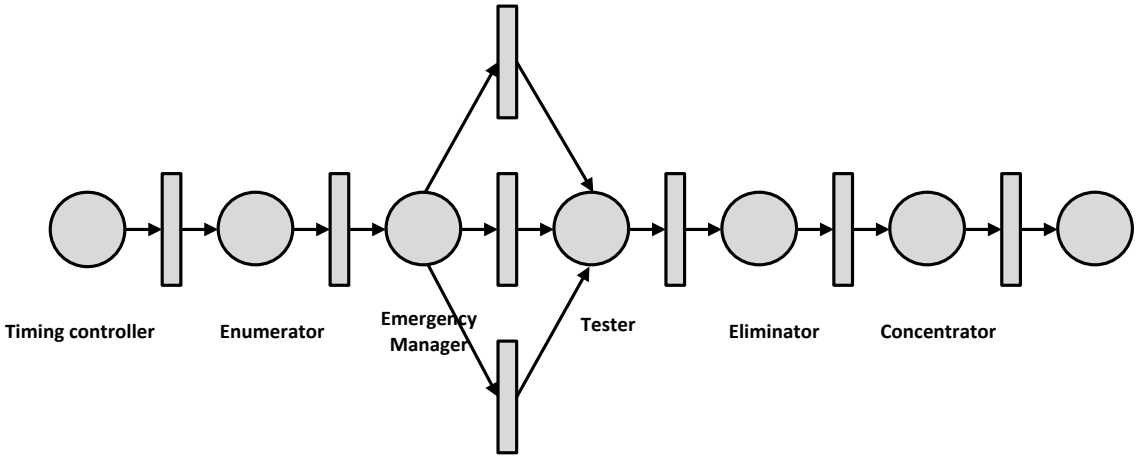


Figure 7. Petri-net