CS350 Midterm

Spring 2018

You can answer the questions either in English or Korean.

The total score of this midterm towards your final grade will be 25%.

1. Here are the two Unmanned Shops story:

   One US1 is as follows: The shop is fully automated such that a customer picks up items in the store shelves and passes through the exit door, and then the shop automatically charges to the customer's credit card that was registered by the customer in advance.

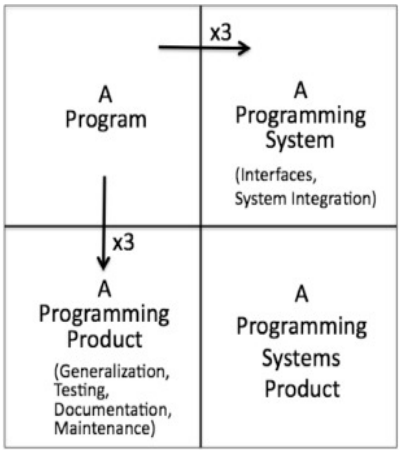
   The other shop US2 is as follows: It is the same as the US1 in that no sales staffs exist in the shop. However, in US2, the customer has to scan the barcode of each item he/she wants to buy, and also has to swipe its credit card through the device.

   (a) In US1 and US2, which shop do you prefer? Give the reason to your answer, assuming that you are the owner of the shop. (5pts)

   (b) In implementing such shops, the role of software becomes more important than before. Compare the role of software in each of US1 and US2, with respect to the service provider, consumer/customer, and three layers of software such as commonality, value-added, and innovative. (10 pts)

2. Brook's classification of program types in his book, 'Mythical Man Month' is as follows:

   Explain briefly each of four types and what he emphasized here. (10pts)



3. System Availability can be defined as the ratio of time during which the system is on service.

(a) What is MTTF? (2 pts)

(b) What is MTTR? (3 pts)

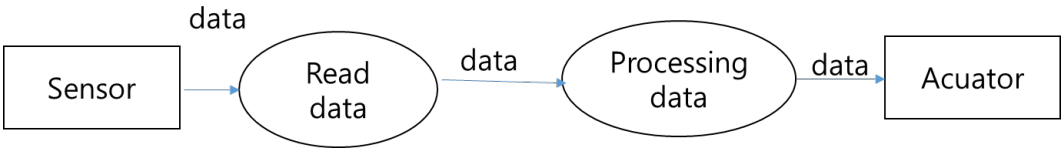
(c) Define Availability with MTTF and MTTR. (5 pts)

(d) What is 'Chaos Monkey'? (5 pts)

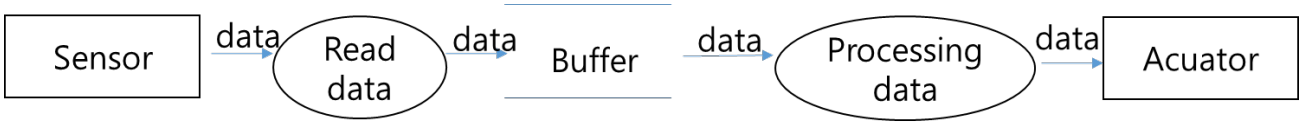
(e) How can 'Chaos Monkey' be used to check the availability of the system? (10 pts)

4. Here are two high-level DFD's whose requirements are the same.

(1)



(2)

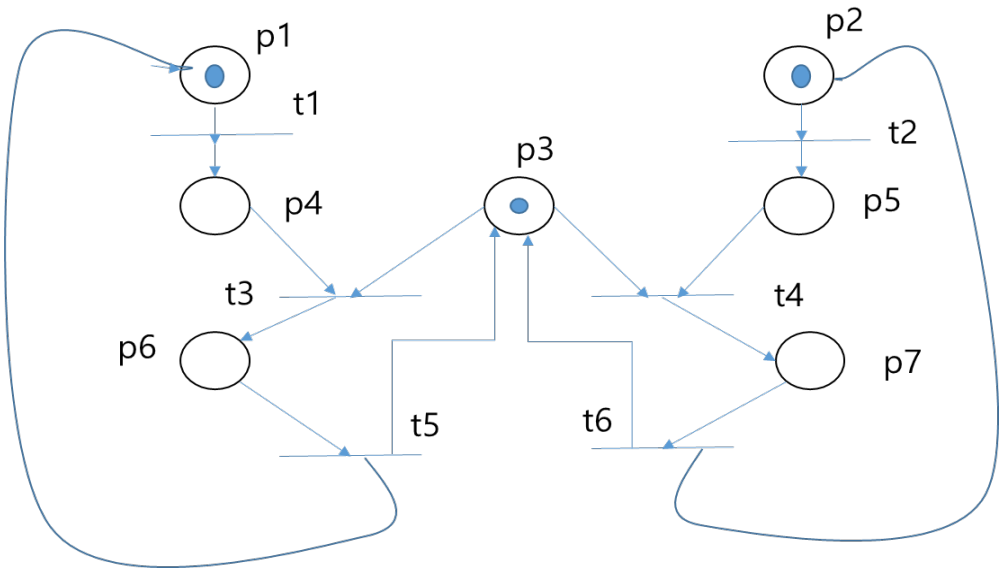


(a) Describe an example system whose high level functional requirements correspond to the DFD shown in (1). (10pts) (Choose an example and specify its high-level requirements.)

(b) The one difference between the two DFDs is the existence of a data store, Buffer in (2). Explain an important difference between the two DFD's, using the example system given in (a). (10pts)

5. We have two processes PA and PB such that each process represents writing/printing a file. PA and PB's operational specifications are given in the following Petri-net.

   Here, P1 is an input place of PA and P2 is the input place of PB, and P3 represents a printer available for PA and PB. (Note that the printer can only serve one printing process at a time.)



(a) There can be a set of pairs of transitions that can be executed in parallel. List all of such pairs. (10pts)

(b) In the above net, we cannot guarantee that PA and PB are alternated. (PA, PB, PA, PB, PA,...)

(Or, more specifically, t3, t4, t3, t4, t3, t4,....)

Modify the above Petri-net so as to enforce an alternation policy. (10pts)

6. Software Engineering is to apply '**systematic**' and '**quantifiable**' approach to the development, operation and maintenance of software. Explain the meaning of (a) **systematic** and (b) **quantifiable** in the above definition by using the *separation of concern* principle. You can use the example used in class for explaining the separation of concern during ((a) 5 pts, (b) 5 pts)