

# EE249 HW #2

Courtesy of Alessandro Pinto  
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Goal of HW2 is to work with Petri Nets. General Comment: Your solution could be right or wrong, but in Embedded System Design there is a lot in between. We consider your homework as solution to a design problem. A solution could be right but inefficient, efficient but wrong etc. Grade is established mostly on the reasoning that you follow to answer the questions. Therefore, it is in your interest to *justify your claims*. You can use any kind of sources as long as you include references.

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## Modeling a packet processing sub-system

There are many ways of transferring data through a network. The network that you are most familiar with, the Internet, is a packet switched connectionless network. It is *connectionless* in the sense that given a source host and a target host, there is no need to establish a connection through the network in order to send data from one to the other. In other networks, like the one based on ATM (Asynchronous Transfer Mode), a connection has to be established first. During the connection setup, all the network resources needed to transfer packets from source to destination are reserved for that connection. When the transmission ends, all the resources are released and made available for other connections.

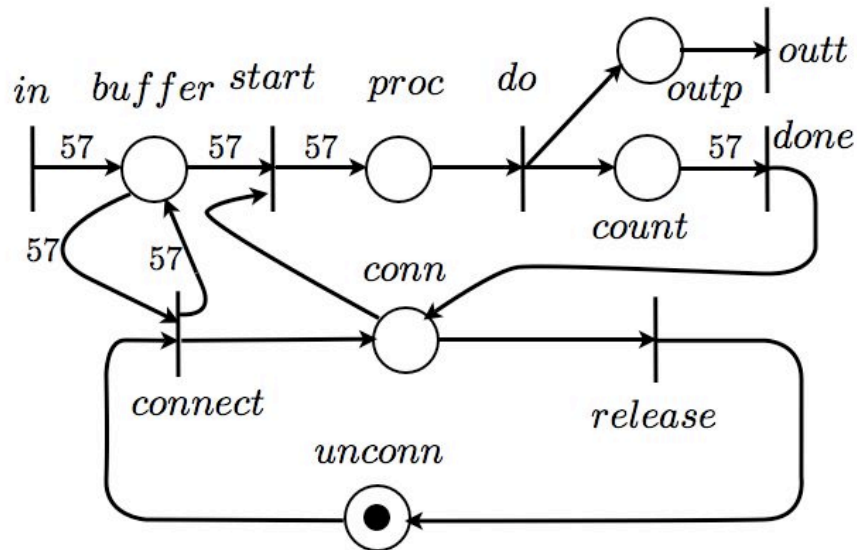


Figure 1: Petri-Net model of the connection-based packet processor

The Petri Net in [Figure 1](#) shows the model of a connection-oriented packet

processing.

**Question 1 : Give an intuition of how the system works.**

Now that you have an intuition of what the system is supposed to do, you should be able to do some formal analysis on it. Let the transitions be ordered as follows:

(in,start,do,done,outr,release,connect)

and the place as follows:

(buffer,proc,conn,unconn,count,outr)

**Question 2 : Prove that it is not possible to process a packet if the connection has not been established. Formally, marking  $(0,57,0,1,0,0)$  cannot be reached from initial marking  $(0,0,0,1,0,0)$ .**

**Question 3: Is this a Free Choice Petri Net?**

Now it is time to actually generate code. Find a periodic schedule for the network using the method that you like and then answer the last question.

**Question 4: Write a C program that simulate the Petri Net model. Assume that each transition is a task that only consumes and produces tokens.**