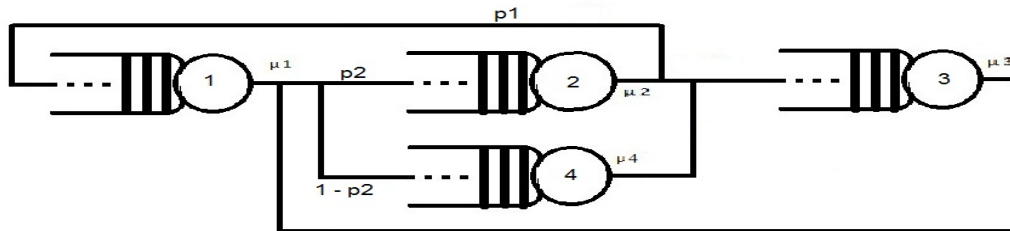


Example:

Consider a city consisting of four visiting sites. The visitors begin with any one of the four places. The visitors beginning with place 1, leave the place for place 2 with probability 0.65 and for place 4 with probability 0.35. With probability 0.45, the visitor reaches back to place 1 and with probability 0.55, the visitor reaches place 3, after which the customer again goes back to place 1. From place 4 also, the visitor is directed to place 3. It is assumed that the system begins with 2 customers at place 1; 4 customers at node 2; 3 customers at place 4 and 5 customers at place 3. The time for which the customer stays at each place is random and follows exponential distribution. The average time spent by a customer in place i is $1/i$, $i=1,2,3,4$. Assuming that the scenario is modeled as queuing network shown below, evaluate the measures of effectiveness.



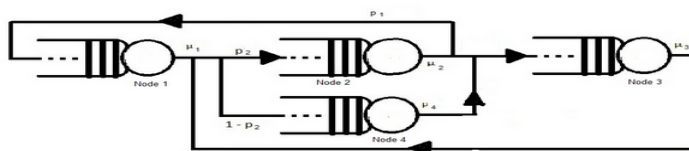
Solution:

According to the question, the service rate at each place i is i . In order to obtain the measures of effectiveness, in steady state as well as via simulation, we follow the steps as shown below:

- Open the page where the experimentation is to be performed
- Feed the data as shown:

Closed Network Queue

The closed queuing network is



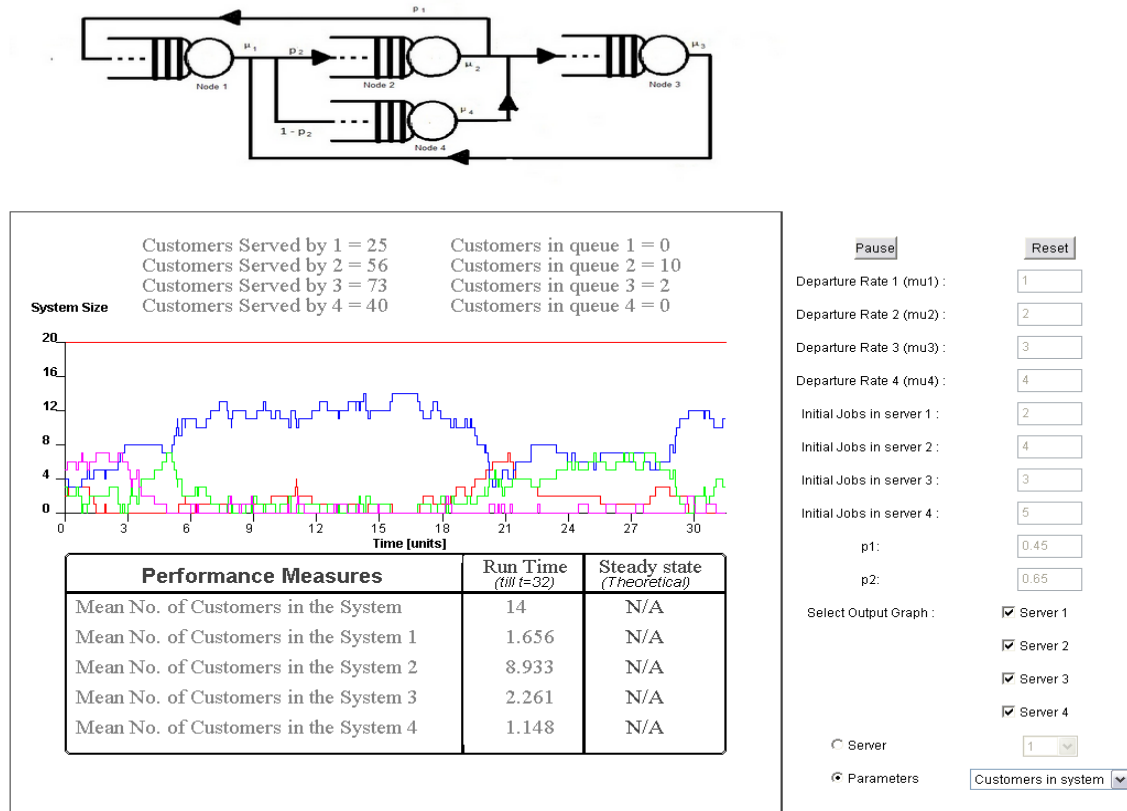
Start
Reset

Departure Rate 1 (mu1) :	<input type="text" value="1"/>
Departure Rate 2 (mu2) :	<input type="text" value="2"/>
Departure Rate 3 (mu3) :	<input type="text" value="3"/>
Departure Rate 4 (mu4) :	<input type="text" value="4"/>
Initial Jobs in server 1 :	<input type="text" value="2"/>
Initial Jobs in server 2 :	<input type="text" value="4"/>
Initial Jobs in server 3 :	<input type="text" value="3"/>
Initial Jobs in server 4 :	<input type="text" value="5"/>
p1:	<input type="text" value="0.45"/>
p2:	<input type="text" value="0.65"/>
Select Output Graph :	<input checked="" type="checkbox"/> Server 1 <input checked="" type="checkbox"/> Server 2 <input checked="" type="checkbox"/> Server 3 <input checked="" type="checkbox"/> Server 4
Server	<input type="text" value="1"/>
Parameters	<input type="text" value="Customers in system"/>

- Next, click on the **‘Start’** button to obtain the desired measures of effectiveness

Closed Network Queue

The closed queuing network is



- In the simulator, we are able to see graphs of the number of customer at each node (since Server1, Server 2 and Server 3 are ticked on the right side of the window)
- We also see an option for **‘Parameters’** from where we can choose the measure of effectiveness required.