

Healthcare Clinic

Consider a walk-in healthcare clinic with the following stations/offices:

STATIONS/ OFFICES	CAPACITY	SERVICE (MINUTES)	TIMES
REGISTRATION	1	Random.Triangular(1,2,3)	
TRIAGE	1	Random.Triangular(3,5,7)	
TREATMENT	2	Random.Triangular(7, 10.5, 14)	
LAB	4	Random.Triangular(6,10, 14)	
XRAY	1	Random.Triangular(8,10,12)	
MRI	2	Random.Triangular(14,18,22)	
EKG	1	Random.Triangular(20, 25, 30)	
ACCOUNTING	4	Random.Triangular(2,5,8)	

The arrival rate of patients is 40 patients per hour. The clinic has distinct types of patients:

TYPE PATIENT	OF PATIENT MIX (%)
WALK-IN	23
LAB-ONLY	47
EKG	4
XRAY	12
MRI	14

The patient routing sequence is given in the following table:

	PATIENT ROUTING SEQUENCE							
	<i>Reg</i>	<i>Triag</i>	<i>Trea</i>	<i>La</i>	<i>Xra</i>	<i>MR</i>	<i>EK</i>	<i>Acc</i>
	<i>.</i>	<i>e</i>	<i>t.</i>	<i>b</i>	<i>y</i>	<i>I</i>	<i>G</i>	<i>t</i>
Walk-in	1	2	3					4
Lab-only				1				2
XRay	1				2			3

<i>MRI</i>	1	2	3
<i>EKG</i>	1	2	3

Assume that the healthcare clinic works 24 hours. Your model should include the following characteristics/features:

- Entities should move from station to station instantaneously (0 simulated time)
- Name the object instances in your model
- Use Google 3D Warehouse or/and Simio symbols to find appropriate symbols for the model. Develop an interesting animation for your model
- Create a status plot that displays (1) the instantaneous number of patients in the system and (2) the average number of patients in the system.
- Create pie charts to show the utilization of each server.
- Create an experiment with 20 replications, 500 hours of run-length, and 100 hours of warmup.
- Compare your simulation results to steady-state queueing theoretic results to confirm that the simulation model is representing the system to be studied (**baseline model**).
- Suppose the patient **arrival rate** increases by 5%. Can the current system handle the increase? What about 7%? 10%? Compare the expected time patients spend in the system (by patient type), waiting times at each station, and the number of patients in the system for the baseline, +5%, +7%, and +10% scenarios. (Use **referenced Property** to set up the four scenarios with different interarrival times)
- Add an additional patient type "Treat-Lab" (sequence: registration, lab, treatment, account, depart) such that proportions now become Walk-In 22%, Lab 43%, Xray 11%, MRI 13%, EKG 4% and Treat-Lab 7%. The new arrival rate is as follows:

Time Period	Average Number of patients Arriving in Time period
0:00 to 4:00	160
4:00 to 8:00	172
8:00 to 12:00	184
12:00 to 16:00	184
16:00 to 20:00	172
20:00 to 24:00	160

Can the system handle these new patients? If not, what is your recommendation (be specific)?

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