# Lab3 – Markov Process and Markov Chain

Objectives:

Markov process and Markov chain is a very important and useful tool for modeling and simulation real world systems. This workshop is to let students study the theory and learn how to apply them to solve system reliability problems through hands-on modeling and simulation.

Requirement:

1. Complete Workshop2 to learn basic theory of Markov process and Markov chain
2. Re-examine the system reliability problems (problem#1, #2 and #3) presented in CSC754 Lecture#5 to form a proper model for each problem by define the model parameters, state variables (random variables), initial condition. Restate each problem in terms of the parameters and state variables you defined for the model.
3. Then solve all the problems analytically by derive close-form mathematical solutions (show the steps how you get to the solution by indication of which Markov property/rule you applied).
4. Conduction a simulation experiment for problem#3 by construct a simulation program. Then run simulation with the initial conditions set as: initial state with 2 servers, run 1000 time steps. Set the parameter values as a=0.1 (failure rate), and b=0.6 (renew rate).
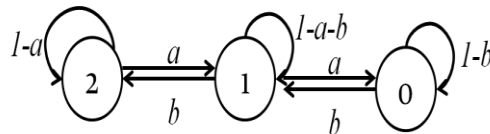
5. Comparing your analytical solution with your simulation solution under the same condition and parameters. Provide your conclusion/comment about your simulation.

Deliverables to be submitted:

- A study report includes your answers to the above required questions 2, 3, 4, and 5 (must be in MS Word or PDF file).

- You simulation program source code files.