



Lehrstuhl für Simulation

Applied Discrete Modelling

Assignment 1 “Machine Temperature”: DTMCs

System Specification

A machine has two states. It can be either in *High Performance Mode* (HPM) or in *Low Performance Mode* (LPM). The probability to change from HPM to LPM in one step is 0.02. The one step transition probability from LPM to HPM is 0.1. At the beginning of the simulation the machine is in HPM.

Assuming that the machine produces one part per time step, the probability to produce a working part in HPM is 0.95 in LPM only 0.8.

Implementation

Construct a general DTMC solution program in a programming language of your choice. The program should compute steady state and transient solutions and import DTMC specifications in the format given in the exercise.

Tasks and Questions

Specify and draw the DTMC representing the system.

Use your program to answer the following questions:

- What is the probability that the machine is in HPM after 8 minutes if one time step represents one minute?
- What is the probability of producing a working part in the next minute?
- Does this model have limiting or stationary solutions? Why?
- How long does the system need to reach a stationary solution?
- What is the probability to be in HPM in steady state?
- What is the average probability of producing a working part in steady state?