1. Exercise

Out	Discussion
13.04.11	26.04.11

Contact by questions
Prof. Dr. Mesut Güneş, mesut.guenes@fu-berlin.de

General information about the exercises
Accompanying the lecture, we will give out problem sheets. Some of the problems will ask you to write a program to implement a simulation. For these problems you can use your favorite programming language. You should solve the problems on your own or in a small group. You do not need to submit your solutions. With each problem sheet you will be asked to read one paper and prepare it for discussion. All papers will be available on the homepage of the course. Students are highly encouraged to present their own solutions in the tutorial and to discuss them.

Problem 1: Components of a system

Name several entities, attributes, activities, events, and state variables for the following systems:

a) A cafeteria

b) A grocery store

c) A fast-food restaurant

d) A hospital emergency room

e) A taxicab company with 10 taxis

f) A local area network (LAN)

g) A wireless local area network (WLAN) installation with 3 *Access Points* (AP).

Problem 2: Process of a simulation study

Consider the simulation process shown in the class.

a) Reduce the steps by at least two by combining similar activities. Give your rationale.

b) Increase the steps by at least two by seperating current steps or enlarging on existing steps. Give your rationale.

Problem 3: Monte Carlo Simulation

Write a *Monte Carlo Simulation* program in your favorite programming language (Java, C/C++, Python) or use a spreadsheet tool like Excel or Openoffice.Calc to approximate the value of π. Use the approach presented in class or a similar one.

a) Produce approximations for π with 100, 1.000, 10.000, and 100.000 random points. Measure the required time and calculate the difference to π.

b) Discuss advantages and disadvantages of this simulation method.

Problem 4: Dynamic continous simulation

Write a simulation program in your favorite programming language (Java, C/C++, Python) to the presented *predator-prey* problem in class.

a) Consider the system under the following configuration:

- $r = 0.001$, $a = 2{\times}10^{-6}$, $s = 0.01$, $b = 10^{-6}$, and the initial population sizes $x(0) = 12000$ and $y(0) = 600$.

b) Draw the graph of $x(t)$ and $y(t)$ for $t = 0..4000$.

c) Play around with the settings, e.g., $x(0) = 6000$, $y(0) = 3000$, change some of the parameters r, s, a, b. What happens with the population sizes $x(t)$ and $y(t)$?

Problem 5: Simulation models, reading

Download the paper »On credibility of simulation studies of telecommunication networks« by Pawlikowski et. al from the website of the class.

Discuss the paper and the findings of the authors. What are their main findings?