

Simulation Modeling and Implementation: A Hands-On Approach Using Event Graphs and Python

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Simulation is not an advanced exercise in programming. Building a model must precede any attempt to write code. Most modeling formalisms are hard. Further, translating models constructed in these formalisms into code is even harder. Event graphs is a modeling formalism which is characterized by its simplicity and power. It can be used to construct event-driven simulation models for complex systems such as queueing networks and flexible manufacturing systems. Combined with the Python programming language, a workflow can be established for discrete-event modeling and simulation. Starting with a system to be studied, a simulation model is constructed as an event graph which is then translated into Python code. In small- to medium-sized problems, the translation from model to implementation can be performed manually.

In this tutorial, participants will be introduced to event graphs and how they can be used for modeling queueing systems. They will also learn how to translate event graphs into Python code using simple programming abstractions and idioms. The implementation will be done in Python. Several exercises and case studies will be given to reinforce the acquired knowledge and skills. Most of the material of the tutorial will be based on the following book:

Yahya Osais, “Computer Simulation: A Foundational Approach Using Python”, Chapman & Hall/CRC, 2017.

Biography

Yahya E. Osais is a faculty member in the department of computer engineering at King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia. He earned his B.Sc. and M.Sc. from the same department in 2000 and 2003, respectively. In 2010, he obtained his Ph.D. from the department of systems and computer engineering at Carleton University, Ontario, Canada. Dr. Osais regularly teaches a graduate course in computer simulation for students in the college of computer science and engineering at KFUPM.