Proceedings of the 2015 Winter Simulation Conference
L. Yilmaz, W. K V. Chan, I. Moon, T. M. K. Roeder, C. Macal, and M. D. Rossetti, eds.

C# PARADIGM FOR DISCRETE EVENT SIMULATION MODELING

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ABSTRACT

For complex industrial problems, the discrete event simulation (DES) is a powerful tool to evaluate the performances of system configuration and seek for the optimal solutions. And C# is a fast evolving programming language that is designed to be simple, general-purpose, and object-oriented in developing a variety of applications that run on Microsoft .NET Framework. In this paper, we provide an alternative way to build DES model in C# language, and demonstrate that compared with a commercial DES package the paradigm is compact and flexible, as it facilitates the integration with database, user-interface, or a simulation optimization infrastructure with advanced features, e.g., parallel evaluations and simulation budget control.

1 INTRODUCTION

Many industries have applied the discrete event simulation (DES) as an analytical tool to evaluate their system performance either in a deterministic and stochastic manner. In a long run, commercial software packages remain as the main approaches for such kinds of analysis, and AutoMod (Muller 2011), FlexSim (Nordgren 2002), and Arena (Kelton et al. 1998) are the typical examples. Usually, the software packages provide a graphical interface for the users to build the model and is able to show fantastic animation for them to have a first-hand experience of what will be happening in the system.

Main advantage: easy for scientists and engineers with limited programing capabilities to build a flexible simulation model, for scenario analysis and optimization.

Some feature:

- easy for UI with MVC
- easy for database with entity framework
- easy to integrate with optimizer in C#
- easy for parallelized evaluation
- discontinuous evaluation, for sequential allocation of simulation budget and
- time-dilated evaluation

2 BACKGROUND

3 THE FRAMEWORK

Talk about the generic components, including scheduled events, future event list, and clocks. use class and sequence diagram to show how it works.

To build a simulation model, three categories of information should be added on the framework, i.e., scenario model, status model, and events. refer to the example below.

4 CASE STUDIES

4.1 M/M/1 Queue

parallelization

4.2 A Workshop Problem

with time dilation

4.3 Aircraft Spare Part Management

UI and database
with optimization

5 CONCLUSION

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