

CSIM 19 User Story

Interview with Dr. Cosimo Anglano: A Customizable Simulator for Peer-to-Peer Networks using CSIM 19



Background

Dr. Anglano is a professor in the Computer Science department (Dipartimento di Informatica) at the Università del Piemonte Orientale in Alessandria, Italy. His research focuses on distributed computing systems, with particular emphasis on Peer-to-Peer Computing and Cluster Computing.

Tell us a little about Peer-to-Peer Networks and your research:

Peer-to-Peer (P2P) networks are becoming increasingly popular for data storage, sharing processor power, and providing online services such as distributed backup, among other tasks. In a P2P network, each computer has equivalent capabilities and responsibilities; there is no central "server."

My students and I have written a CSIM 19 application that we call *CuSimP2P*. Our software simulates Distributed Hash Tables (DHT), a variant of Peer-to-Peer systems. A hash table is a method of storing information based on some quality of the information being stored. In a Distributed Hash Table architecture, data is distributed across many computers in P2P network, rather like a file cabinet in which the filed information is distributed across multiple locations.

Recent P2P research focuses on providing efficient hash lookup algorithms that can be used to build more complex systems. This project, a customizable simulator for P2P networks, simulates different DHT algorithms to determine behavior and performance

Please describe your CSIM 19 application:

A key consideration in DHT systems is the ability to find and return the appropriate data very quickly across widely distributed networks. There are many architectural models on which a DHT may be based, as well as many different

Application Area:
*Performance
Measurement of
Computer
Architectures*

Platform:
LINUX

CSIM 19's Challenge:
*Evaluate the
performance and
behavior of different
architectures for
Distributed Hash
Tables*

algorithms for determining where to store the data. Our goal is to evaluate the performance of these different architectures and algorithms using CSIM 19. We compare their behavior with respect to their read/write performance and their data availability in case of possible network and/or node faults.

The CuSimP2P software is customizable in the sense that it is not specific for a particular DHT architecture or algorithm. Rather, a user may write his or her own DHT protocol code to allow maximum flexibility. The simulator estimates a variety of performance indices for each architecture, including message delivery time, success probability of queries, query completion time, and others.

What are your requirements for the simulation?

Our main requirement for the simulator is performance, since we have to carry out many simulation experiments. So our first goal is to reduce the overall completion time of our simulation batches as much as possible. Our second consideration is rapid development time – we didn't want to spend too long writing the simulator itself. Our final requirement is superior accuracy in the statistical estimation procedures.

Why is CSIM 19 a good tool for your application?

We found that CSIM 19 is ideally suited for our requirements. The main benefit we experienced from CSIM 19 was its low development time, resulting from its large number of useful classes; in particular, those for performance indices estimation, run length control and process creation. We also appreciate the relatively low execution time provided by CSIM 19. As well, it allows us to easily integrate the custom code required for new DHT systems that we need to study.

What was your biggest challenge with the CuSIMP2P project?

The most difficult part of this application was specifying the code of the various processes that represent the entities we needed to simulate.

What are the results of your project?

We are still running our simulations in order to study the behavior of some DHT systems.



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- Dr. Cosimo Anglano

It is worth mentioning that the few problems we encountered with CSIM 19 during the development of CuSimP2P were quickly solved by the CSIM support team, whose members were always fast in providing us answers and bug fixes.



To learn more about the CuSimP2P project and Dr. Anglano's research, please contact him directly:

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***Important CSIM 19
Features for
CuSimP2P:***

- *Random number generation*
- *Results collection*
- *Run length controls*
- *Process creation and management*