Thesis Review: An Efficient, Unifying Approach to Simulation

Using Virtual Machines

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by Rimon Barr - May 2004

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A Review by:

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Abstract

This thesis work dealt with the issue of making a scalable simulation that is both efficient and generally platform independent. The solution was to use a java virtual machine to run an efficient event-driven simulator. The simulator presented is called *JiST*, a **J**ava **I**n **S**imulation **T**ime. The author, then illustrates the use of his simulation engine by applying it to a **S**calable **W**ireless **A**d **H**oc **N**etwork **S**imulator (SWANS). This paper reviews this thesis, summarizing the general ideas, evaluating there worth, and finishes with a critique and discussion of implications.

1 Intro

Many of the approaches to scalable simulation that existed at the time of this thesis, were both hard to develop on and not scalable enough to model things such as wireless medium or the interference between arbitrary signals in that medium. Barr set out to utilize Java and associated tools to make a simulator that deals with both of the stated with problems with the current state of the art. Another major aspect of his approach was the use of virtual machines in a scalable simulator. The two would seem adversarial rather than synergistic, given that scalable implies efficient use of the hardware and virtual machines require abstraction layers that muddle efficient use of actual hardware. However, the use of virtual machines allowed him to design a simulator that is **virtual**ly platform independent!

2 What this work accomplished!

The application of this simulator to create a scalable wireless network simulator was a great choice on the part of Barr. The realistic modeling of wireless communication and the interactions within related networks is a challenge indeed! Often used simulators, such as NS2 and GloMoSim cut corners to avoid exponentially scalable noise/interference calculations associated with modeling radio dynamics. Barr sets out to use clever algorithms that utilize quad trees to prune computation paths, and maintain the legitimacy of their calculations within reasonable bounds. Remember, all of this was done on top of virtual machines providing users with a java development platform that eases software development.

3   Evaluation & Critique

In short, my evaluation of this thesis is tightly bounded by the extent to which I understand its application. Having worked with wireless networks and their simulators, I can verify the worth and scalability of this simulator model in respect to other simulator models. And in this respect the project is a great success, and worthy contribution to the research community. On a more practical note, the project would have been more suited for industry research. For instance, if a researcher at Sun had developed this simulator to support company presence in the wireless network industry/community it would have made perfect since. However, I feel this particular project had more worth as an application than as a research topic. While many novel ideas were combined for the first time, I feel that the project as a whole was just that, a clever combination of others' research ideas - rather than an theoretically original work in itself. This does not devalue the project, but implies that this project serves as an example of PhD work that crosses the line into application territory. This work is of "engineering project" nature and not that meant for a "Doctorate of Philosophy."

4   Implications and Final Thoughts

What does this imply for my PhD study? In short, "Get it done!", do what is necessary to convince the powers that be that I am worthy of the degree. This will require an understanding of the powers that be and then I must use that understanding to self-evaluate my work through this study such that I can assure my projects will be deemed worthy. Anyways, it's not me that will finally evaluate my projects worth - so I should get a good handle on those that will evaluate it.