

Sabbatical Leave Report for the period August 20, 2007 to May 9, 2008

Soner Onder

My sabbatical leave has been very productive and refreshing. During my leave, I continued to advise my students remotely, taught a graduate course at the Department of Computer Engineering, Middle East Technological University (METU), presented two seminars, recruited one Ph.D. student, wrote a book chapter in a prestigious Morgan Kaufmann Book, developed my software toolkit, served on the Ph.D. committee of one student at METU, established new research collaborations, and supervised a master's student jointly with Dr. Nilufer Onder of MTU and Dr. Pinar Senkul of METU. I also developed software related to my NSF CAREER award, freeing up my students to concentrate on their own Ph.D. topics.

I would like to present my efforts during this period by listing my initial goals and descriptions of how I achieved them. The objectives of my leave were:

1. Further extend, update and develop the Flexible Architecture Simulation Toolkit (FAST):

FAST is a research and educational architecture simulation system which I had developed during my Ph.D. studies. This tool enables rapid development of simulators which are crucial for experimental research in my field. Furthermore, this tool was being used in teaching two computer architecture courses at MTU, namely, Computer Architecture (CS4431) and Advanced Computer Architecture (CS5431). This tool still is the primary means to introduce our students to the key concepts in the field of Computer Architecture.

My work during this period improved the tool by addressing most key problems. Furthermore, I wrote a book chapter that describes the Architecture Description Language (ADL) that the toolkit is based on.

Processor Description Languages, Volume 1 (Systems on Silicon) by Prabhat Mishra (Author, Editor), Nikil Dutt (Editor), Morgan Kaufmann (June 2, 2008), ISBN-10: 0123742870.

As a result, the ADL language that I have designed is now recognized as one of the 12 Architecture Description Languages in my field.

2. Implementations regarding my NSF CAREER award: I wanted to use part of my time to implement several key pieces of software that would further the goals of the CAREER project. As I have indicated in my sabbatical application, the implementation of key concepts on existing compilers is particularly difficult, because the techniques which need to be implemented are drastically different than the traditional ones.

By shouldering part of the implementation effort during my sabbatical leave, I was able to have my Ph.D. student Shuhan Ding concentrate on the algorithmic aspects of the work. Her focused efforts resulted in rapid progress. She has successfully defended her proposal and published a paper in a respected conference :

Unrestricted Code Motion: A Program Representation and Transformation Algorithms based on Future Values, Shuhan Ding and Soner Onder, International Conference on Compiler Construction (CC 2010), Paphos, Cyprus, 2010.

My work with Shuhan has been progressing quite well, with the promise of additional highly rated conference and journal publications. I am expecting Shuhan to graduate within a year, given the progress she has made.

3. Seek collaborations: Another goal of my sabbatical leave was to explore and establish new collaborations. I established a new collaboration with Dr. Pinar Senkul of METU in her expertise areas of data-mining and machine-learning. Together with Dr. Nilufer Onder of MTU, we have jointly supervised Mr. Engin Maden, who successfully defended his M.Sc. thesis recently. This work has also led to define the Ph.D. topic of Mr. Hui Meen Nyew at Department of Computer Science (MTU). Hui Meen is testing and developing machine learning algorithms for computer architecture development under our joint supervision with Dr. Nilufer Onder.
4. Recruit students: An important goal for me was to recruit new Ph.D. students for my department. Middle East Technical University in Ankara is a premier research university with excellent students. I taught a graduate-level course at the Department of Computer Engineering with the hope of drawing interest from these excellent students. As a result of this effort, I have successfully recruited Mr. Murat Koksal, who is now working towards his Ph.D. at MTU under my supervision.

In summary, during my sabbatical leave, I have accomplished several important tasks which are important for my career, as well as helping with the reputation of Michigan Tech as a premier research institution. I am looking forward to further reaping the benefits of my work during my sabbatical leave.

Soner Onder
Associate Professor
Department of Computer Science
Michigan Technological University