I. Introduction

I received my first sabbatical during fall 2005, for which I am deeply and profoundly grateful. During that time I worked on two research projects: developing the Starfish system, and exploring limits of knowledge in distributed systems and the human condition. I additionally worked on two projects for personal growth: pursuing physical fitness and wellness, and taking voice lessons. I will describe all of these projects below.

II. Discussion of Research Projects

A. Development of the Starfish system

Starfish is a new computer system I am currently developing that provides intrusion detection and intrusion tolerance for middleware applications operating in a distributed asynchronous system. The Starfish system contains a central, highly secure and tightly coupled “body.” This body is augmented by “arms” that are less tightly coupled and that have less stringent security guarantees, each of which can be removed from the body if a significant security breach occurs. New arms can be “grown” as needed; this regenerative property motivated my choice of the Starfish name.

At the beginning of my sabbatical, I was notified by the National Science Foundation that my proposal for $178K to support work on the Starfish system had been fully funded. This was a huge encouragement; I had submitted four prior NSF research proposals (both individually and in collaboration with faculty members at Carnegie Mellon) that had not been funded. Because of this news, I focused my sabbatical research more directly on work for the grant, and therefore primarily on the Starfish project.

I worked on developing an intrusion tolerant protocol for communication over a wide area network. It will form the backbone for communication within the larger Starfish system. It is a gossip-based protocol, which scales well over many computer nodes. The basic protocol is based on work done by Kermarrec, et al. at Microsoft Research, Cambridge, UK. Their protocol scales well over many nodes but is resistant only to crash faults, not Byzantine faults, and is therefore not intrusion tolerant. Using modular transformation techniques described by Baldoni, et al. at Campus Universitaire de Beaulieu, France, I developed a new protocol that is intrusion tolerant. Students are now implementing this protocol, and once the implementation is complete and performance measurements have been performed, we will be submitting at least one paper for publication.

B. Limits of knowledge in distributed systems and the human condition

In a seminal work in distributed computer systems, Halpern and Moses wrote, “distributed knowledge corresponds to knowledge that is ‘distributed’ among the members of a group, while common knowledge corresponds to a fact being ‘publicly known.’” They demonstrated that, while being highly desirable, common knowledge is unattainable in any practical distributed system. This limit on knowledge attainable in a distributed system provides insight into the larger picture of the human condition. In I Corinthians 13:12 we read “for now we see in a mirror dimly, but then face to face.” While God’s view is perfect and complete in knowledge, we as limited humans cannot attain common knowledge in this life.
I did much reading and thinking with respect to this project. I felt as though I renewed a love of research that I had not experienced since graduate school as I worked on this topic. I will be writing a paper on this work to submit for publication.

III. Discussion of Personal Projects

A. Voice lessons

During sabbatical I also pursued a lifelong goal of taking voice lessons. I had weekly lessons with Celeste Tavera, which were wonderful and very therapeutic. I grew up loving music but being ridiculed and told that I couldn’t carry a tune. It was a remarkable discovery that I really could stay on pitch after all, but that my vocal quality needed (and still needs) training and improvement.

B. Personal fitness and wellness

Prior to the sabbatical, my only form of exercise consisted of walking from my office to my classroom. I knew this needed to change, not only for physical health, but also for emotional health. I met with Glenn Town, who guided me in establishing a program of fitness including daily power walks. During my walks I made extensive use of the wonderful paths created by Paul Willis, and I found incredible enjoyment in the sights, sounds, and smells of nature.

A verse from Isaiah serves to summarize my personal projects: “See, God has come to save me. I will trust in him and not be afraid. The LORD God is my strength and my song; he has become my salvation.” (Isaiah 12:2). He has given me both physical strength and a voice in song during this sabbatical.

IV. Results and Benefits

The primary benefit that I received from sabbatical was that of rest, coincidentally the main purpose of Sabbath, from which the concept and name for sabbatical comes. It was the first real break I had taken since beginning my Ph.D. work in fall 1994. After five years of working on a Ph.D. as a re-entry student with three kids at home, followed directly by six years of teaching in a fast-changing field, the first four as the only faculty member in a new major, I was physically and emotionally spent. In fact, I applied for sabbatical in the fall rather than spring because I literally didn’t think I could wait one more semester.

The second benefit I received was that of healing. During my sabbatical I was suffering from major clinical depression, which began just after graduation in 2004 and continued into summer 2006. At one point during those two years I was within a few hours of taking my own life, and about six months after that I came very close to resigning from my position. Although the healing process did not finish during my sabbatical, it was certainly accelerated during that time. I am happy to say that I am now as encouraged, energetic, and happy as I have ever been. Voice lessons and daily walks provided significant amounts of healing during my sabbatical, as did rest.

Another result from sabbatical was a change in my daily schedule that has been very positive. During sabbatical I worked on my research at home, having been advised not to come to campus daily in order to protect the time. I found that I love working at home, particularly early in the morning. This is my most productive time; I am a morning person and get up between 3:00 and 3:30 am on weekdays. To this day, I still use time prior to 10:00 am to work at home, doing
research several mornings a week, and preparing classes the remaining mornings. I also continue to take daily power walks during the mornings before coming to campus.

Finally, my research projects moved forward significantly during sabbatical, setting up a renewal in my research that has continued to this point. This semester I have four students working with me, and my research has also been significantly integrated with my distributed systems course. We are making much progress, and I look forward to a great summer with four research students working full time for ten weeks, supported by my NSF grant.

In conclusion, I am profoundly grateful for the sabbatical. I quite literally would not be here today without it, and I feel at this time that I am not just surviving, but flourishing. Thank you so much!!