Why a Ph.D.?

Sam Silvestro
{ssilvestro@gmail.com, sam.silvestro@utsa.edu}

***Abstract*—Just as there are many reasons why someone may wish to pursue an undergraduate degree, there are equally many as to why one might venture to earn a doctoral degree in their field. What follows will be a discussion of my personal reasons, as well as what I believe "doing" research entails.**

I. Introduction

My purpose for pursuing a doctoral degree is actually quite simple: I want to teach at university. As stated before, there are many advantages (and some notable disadvantages) to holding a doctoral degree. I will put forth that the most obvious use of a Ph.D. is in the teaching of students at the college level.

Furthermore, likely the second most well-known role of a Ph.D. also holds true for me personally, and that is to perform research. By performing research, I wish to both contribute to the field of computer science in some meaningful way, as well as to stay current of the latest developments in our field. By directly examining the research of others, I hope to stay abreast of their progress and findings.

To state my "macro goals," I would say I wish to gain experience in my role as a teaching assistant while working on my degree, which should prove valuable in advancing my first stated purpose, which is to ultimately teach. Additionally, I would add that by reading and writing as much research material as possible, I wish to become prepared for performing more research with my own students after graduation.

II. Research

In my limited experience reading the works of others, I believe the process of research involves the following: first, one must cultivate an idea, or more specifically, a problem to solve. The researcher then must decide whether this problem is solvable given both their current knowledge and capabilities, as well as the state of technology at that time. If the problem is indeed solvable (and worthwhile), she must next earnestly pore over relevant research materials such as journals, conference proceedings, and dissertations to determine whether this problem has already been solved, in whole or in part. If the topic has been partially addressed, she may still decide to further the partial solution with her own work.

Once the above prerequisite research has been performed, and assuming she wishes to proceed, she may then decide how to approach the problem. Even within a given field there may be multiple and varied ways of writing a paper, for example, whether the research involves computer security, software engineering, high-performance computing, etc. Each sub-field will likely have a protocol or boilerplate that is expected of articles published within them. This will likely influence how to proceed in conducting the research (for example, in high-performance computing there may be a larger emphasis on benchmarks and numeric results; these would obviously be a critical component of such work, whereas they may not be relevant at all to research conducted on security on the cloud).

For example, if the researcher wishes to demonstrate that a particular ratio of storage to metadata nodes in an object-storage cluster would result in significant performance gains in terms of IOPS or throughput (MB/s), she would perhaps wish to implement a "standard" configuration as well as her experimental model side-by-side, eliminating or reducing outside variables as much as possible. Then, she may proceed with conducting her testing, which should either demonstrate the correctness of her hypothesis, or invalidate it. In the event of the latter, she may wish to investigate to determine why her hypothesis or test configuration were incorrect.

Finally, if all of the above yields substantive results, the last step should be to share these results with others in an effort to seek the comments and criticism of peers. If the researchers work should happen to pass the scrutiny of peer review, that work should be published in an academic journal and/or presented at conference.

III. Research of Others

I will close by briefly adding that I indeed cannot answer the questions, "Whose research do you find most inspiring and why?", and "What research results do you find most interesting?" I can only offer the theoretical answer that I believe I would find most interesting the work whose results prove to establish a simple, though profound and useful idea, that later is quickly expounded upon and comes to serve as a foundation for a new idea, product, or theory. For example, in 2004, Dr. Sage A. Weil published a paper titled "Dynamic Metadata Management for Petabyte-scale File Systems," which laid out the architecture of a new distributed file system that he would later call "Ceph." Today, Ceph is a free software storage platform developed by Red Hat, and is widely used in cloud computing and big data research. Reading such work with the benefit of hindsight is very interesting and actually quite inspiring to attempt to distinguish the features and ideas which help particular research take root and become famous.