Statement of Purpose

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I want to pursue a Postgraduate Doctoral Degree (PhD) in Computer Science, and my career aspiration is to work in the Software Industry as a Research and Development Scientist. My research interests include distributed computing and software engineering.

My motivation for pursuing research related to distributed computing stems from my experience as a software engineer, which comes with the need to deliver reliable, scalable and maintainable software applications. To meet these requirements, one must consider the whole architecture of delivering enterprise application services from the specification of user requirements to the maintenance of the software applications.

Gone are the days when software development was only a matter of putting together code that will run. Nowadays, software developers have to take into consideration the constant shift in user requirements, the need for continuous delivery of application updates and all this while, staying within organisation's limits and meeting it's goals and objectives. The complexities and heterogeneity of current systems make managing them even more the difficult. Software applications must be built to fail (fault tolerant), be able to scale to meet the dynamic nature of client's requests, provide health and monitoring reports and be available always. *Any organisation that designs a system will produce a design whose structure is a copy of the organisation's communication structure. - Melvyn Conway, 1967.*

I aspire to conduct an intensive research on cluster and grid computing technologies, especially as applied to Peer-to-Peer (P2P) computing. Cluster and grid computing technologies are young but evolving rapidly. In current implementations, there is a central control system that manages, monitors and coordinates resources. This implementation however places too much burden on few resources and slows down the whole infrastructure if the central system should fail. I intend to research into a peer-to-peer architecture for managing distributed systems as is already being applied in the Blockchain technology (Bitcoin).

Consequently, the future of creating effective and efficient applications for dynamical visualisation and information systems is tightly linked with taking the advantage of available computational resources. Using Distributed System resources therefore requires new concepts as integrating these resources, that in nearly all case do have an unique architecture and basic system configuration is a challenge for development and portability. There needs to be systems to manage, monitor and provide a holistic view of the various distributed resources. Condor and Globus are currently the most popular platforms for managing clusters and resources in a grid respectively. It is my aim to contribute to the Condor and Globus open source projects through research, feature proposals, bug fixes and active code development. The Condor Project is written in C++ and the Globus Project in C.

For all these reasons, I have built and maintained applications that were deployed in the cloud. I initially interned with a SASS company in India that used AWS Services to manage all their services. From then on, I have been part of two start-ups that I advised to run their applications in the cloud because of its tremendous benefits. I intend to push the limit of cloud hosting to the edge and build Open Source tools that will help organisations manage and utilise cloud services.

Furthermore, I wish to conduct research into software engineering theories and practices. I intend to identify software architectural styles that could leverage the distributed nature of current hardware systems. Such a popular architectural style is the recently emerging Microservices Architectural Style. I have employed the microservices architectural style in a number of projects. Microservices allow development of applications as a set of small independent services. Services can communicate through a popular and often a lightweight mechanism. This allows organisations to build software around business capabilities through evolutionary design. Using microservices however, comes with the challenge of managing the operational complexities introduced by the distributed nature of an application's services.

Essentially, I have experience building enterprise software applications for a variety of platforms. I started building applications for the .NET platform (Windows), then I built apps for the android platform, and then later moved on to web design and desktop apps. I am also fluent with most popular programming languages including: JavaScript, C & C++, Python, Java, Ruby, VB.NET, C#, R, Bash, PHP and Groovy. Moreover, I have experience working with a lot of frameworks and software development tools including Node.JS, Ruby on Rails, ElasticSearch. I have similarly worked with a number of databases, both relational (MySQL, PostgresSQL, SQLite) and non-relational (MongoDB, Reddis) databases. I mastered these tools on their own merit so I can leverage them as appropriate. *I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail. - Abraham Maslow said, 1966.*

In addition to this, I have worked on various software projects that make use of modern software tools and frameworks. I was recently part of two start-ups in India. I worked as the Lead Product Engineer for The Citizen's Hub PVT. LTD and worked as the founder and developer for the Murcho Platform. These platforms make use of microservices, cloud services and follow modern software design patterns.

Although I am open to a variety of research areas, research supervisors at Baylor's School of Engineering and Computer Science whose projects are especially appealing to me are Dr. Tomas Cerny, Dr. Bill Poucher and Dr. Eunjee Song. Looking at various research publications made by various supervisors, Dr. Tomas Cerny research most aligns with my areas of interest.

Finally, Baylor University is known for its diverse culture of Christian commitment, rigorous academic and research programs. These have given me a sense that Baylor’s PhD program is a great match for my interests.

References:

Murcho Platform: https://murcho.com

The Citizen's Hub Platform: https://thecitizenshub.com

Open Source GitHub Projects & Demos: Github Repositories