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 and parallel computing stems from my experience as a software engineer which comes with a need to deliver reliable, scalable and maintainable software applications. This encompasses the whole architecture of executing enterprise applications including: software engineering design patterns, software architectural styles, cluster and grid computing technology and developing tools and libraries that will make the development, deployment and maintenance of these applications simple.

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, whiles staying withing limitations and meeting organisational goals and objectives. Applications must be built to fail (fault tolerant), be able to scale to meet the dynamic nature of clients requests, provide health and monitoring reports and be available always.

> Any organisation that designs a system (defined broadly) will produce a design whose structure is a copy of the organisation's communication structure. - Melvyn Conway, 1967.

Moreover, with science moving toward being computational and data based, the software industry has been tasked with the sole responsibility to produce key software tools and infrastructure to better capture, analyse, model, and visualise scientific information. The future of creating effective and efficient applications needed for dynamical visualisations and information systems is somewhat tightly linked with taking the advantage of distributed and parallel computing resources.

I aspire to conduct an intensive research on cluster and grid computing technologies, especially as applied to peer-to-peer (P2P) computing. I intend to continue my studies of current implementations, get involved in the community and contribute various tools and improvements to the ecosystem of distributed computing.

To elaborate on this, cluster computing refers to combining the powers of two or more commodity-off-the-shelf (COTS) hardware components, as well as free (often Open Source), or commonly used software so they can offer the power required by computational and data intensive applications, and thus playing a major role in redefining the concept of supercomputing. This is made possible because of the availability of high speed networks and increasingly powerful commodity microprocessors. [Rasberry Pi Link].

On the other hand, grid computing promises to provide an infrastructure to dynamically link resources from a large collection of heterogeneous systems without regard to their geographical location. The basic aim is to utilise an enterprise's entire computational resources (servers, networks, storage, sensors, scientific instruments and information), acting together to create one or more large pools of computing power. In the process, it attempts to respect the organisational security policies.

All that's good, and great, and true. However, extensive research is required to be able to reach these goals. There needs to be systems to manage, monitor and provide a single view of the various distributed resources, such as what Condor (for cluster computing) and Globus (for grid computing) are providing. It is my aim to contribute to the Condor and Globus open source projects through research, feature proposal, bug fixes and active development.

As a result of the rise of distributed computing hardware resources, it has began to affect the way applications are designed and developed. It was only recently in 2014, that we saw the emergence of the Microservices Architectural style inspired by service-oriented computing. While there is no precise definition of this architectural style, there are certain common characteristics around organisation around business capability, automated deployment, intelligence in endpoints, and decentralised control of languages and data. Microservices allows development of applications as a set of small independent services. Service can communicate through a popular and often a lightweight mechanism. Services can be deployed independently, written in a different programming language, use its own data models and be managed by a separate team.

Nevertheless, the proposed microservices approach has got iuts