Research Methodology

The term research methodology indicates systematic and theoretical analysis of a particular field in order to extract the knowledge and to achieve intended goal of the work. Research methodology applicable to all the study fields but methods may differ and overlap over many fields of study.

Computer science is one of the field that pursues research actively in order to increase the performance and reliability of the computer systems. Some areas of research can overlap with other areas in computing. There are many domains in computing such as computer engineering, computer science, software engineering and information systems. Each domain need different research methodology and process to conduct research based on the requirements and goal of the work.

Current research method:

In the current research methodology involves series of methods as a path way to conduct research. The following methods which I follow in computer science:

a) Literature study b) Theoretical method c) Simulation method d) Experimental

Literature study involves the finding of the related works and achievements in the computer science field. It is very important that by very definition the research is about producing knowledge and information which is not existed before. In my research area many-core architectures and parallel programming, there are several research groups working on the topic around the world. Without literature study, we cannot define our research goal as our work should be unique. If we found work close to our research goal and if we are reasonably critic and find the space for improvement, that will set the purposeful goal of the research or we can define hypothesis and proceed after the literature survey.

Theoretical method involves the mathematical formulation with logic and come to conclusion of our research goal. Even though the theoretical approach doesn't give precise view of the result, it will give the clarity of the approach and conformation of the guarantee improvement.

Simulation method is important in some cases in computer science. Sometimes, in computer science experiments are very expensive and slow to run. In my research work, I need to run the parallel processing programs on many-core architectures.

The number of cores are dependent on vendor and they are limited. If I use the simulator of the many-core architectures, where I can define how many cores I prefer and other metrics such as cache and memory are also important to be defined. It's hard to go for real hardware for this kind of experiments and very expensive.

Experimental methods start with building a prototype to check the conceptual and formulation model instead of building full scale hardware which is expensive and no way to make changes afterwards. In my research work I run my experiments on Adapteva Parallella 16-core platform. But this is limited to maximum 64-core at present. Where as in simulation environment, I can consider 1000 cores for my experiment. Most of the computer science works at one-point need to do experiments with real hardware setup. Before that, we can check the functionality using small scale prototype.

Improvement methodology

Along with current methodologies, we can incorporate other methodologies from other domains in computing to the computer science area. While implementing in larger scale research project works in computer science, methodologies from software engineering and information science can be adapt.

Methodology such as field study from information sciences and design process from software engineering will give and advantage when implementing large scale research projects. In my research it can be useful to know what the market is expecting and to where the scientific community is heading to when it comes to many-core platforms and also to know new proposed paradigms in the field.

Design process is sequence of events, operations which can be considered to the computer science research. Methodology is about way of doing something. Both design process and methods are two sides of the same coin to pursue the goal. Since my research involves lot coding and testing the software, in my work research work I would consider the design the process with series of phases that I follow to complete the research goal along with methods to improve the quality of the research.