Highlights of HPC Competition 2006:
Cluster and SMP-based Parallel Programming

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The Parallel Speedup (Cluster\(^1\) and SMP\(^2\)) categories of our recent HPC Challenge were the most popular categories in the competition, with entries from various departments including Engineering, Physics, Bioengineering, and Nanoscience and Nanotechnology Initiatives. It was very encouraging to see so many users utilising our resources for parallel programming, harnessing the various parallel applications and tools including MPI (Message Passing Interface) library on our clusters and SMP systems, Matlab MPI, parallelised Fluent, and Amber to name a few. The application areas were also very wide, from real world problems such as fault diagnosis and isolation for chemical processes, hydroplaning simulations, and thermal diode and transistor simulations, to cancer research.

While parallelised applications such as Fluent, Abaqus and Amber are useful and give users parallelisation without much effort, most users usually need to make use of the MPI libraries to make their codes run in parallel.

Although more SVU users are trying out MPI parallel programming, it is important to note that in order to achieve good performance from the MPI programs and to run well on SVU’s parallel cluster and SMP architectures, users have to spend some time optimising their programs and even re-coding some portions of their codes to make them run more efficiently. An understanding of the mechanisms of parallel programming is also important. Therefore, for these categories, we have chosen the following criteria to judge the entries:

- Speedup impact and usefulness to research
- Significance and impact of research
- Creativity and originality

The winning entries were selected because they demonstrated the researchers’ ability to make their parallel programs run optimally on our systems. We would like to congratulate the winners and thank all participants for their contributions. We hope that this competition has also helped participants make better use of SVU’s parallel programming resources.

Happy programming!

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1 A cluster is a group of similarly configured computational servers, running independent operating systems, connected with high-speed interconnections, that can run parallel programs which can be divided and distributed to run on each of these servers. The interconnect serves as a communication channel between these servers in the cluster.

2 An SMP system is a multi-processor system running a single operating system image which is normally used to run parallel programs that can be divided and distributed to run on each individual processor. Communication via cluster-style interconnects is not necessary as every processor can read from the same memory location within the same operating system.