

Message by Chairman, National Grid Steering Committee
At the Official Launch of SG@Schools
(PC Grid Computing for Schools Programme)

06 December 2005

ADDRESS BY REAR-ADMIRAL (RET.) RICHARD LIM, CHAIRMAN OF NATIONAL GRID STEERING COMMITTEE, AT THE OFFICIAL LAUNCH OF SG@SCHOOLS (PC GRID COMPUTING FOR SCHOOLS PROGRAMME) ON MONDAY, 06TH DECEMBER 2005, AT THE [LECTURE THEATRE 4](#), NATIONAL UNIVERSITY OF SINGAPORE

Introduction

I am delighted to see so many enthusiastic young faces. The students gathered this morning represent some of the best brains among their cohort in computer science, mathematics and the sciences in Singapore.

On PC Grid Computing in Singapore

In September 2004, the National University of Singapore set up the Tera-Scale Campus Grid (or TCG@NUS). This is Singapore's first large-scale campus-wide grid implementation that harnesses idle computing capacity of PCs to provide high-speed computing power. Today, over 1,000 PCs have been aggregated to form the TCG@NUS.

The PC grid is realized and implemented using United Devices' Grid MP Platform, with support for deployment as well as development and grid-enabling of applications handled by Singapore Computer Systems.

PC Grid Applications in Singapore

Several interesting and significant applications have been running on TCG@NUS. One that I would like to highlight is the AeroGenome project undertaken by scientists at the Genome Institute of Singapore (GIS) led by Drs Ruan Yijun and Patrick Tan Boon Ooi.

Air quality plays a significant role in public and environmental health but very little is currently known about micro-organisms in the air of urbanized cities like Singapore. The AeroGenome project utilizes the latest DNA sequencing technology to identify the complete repertoire of bacterial microorganisms found in the air in Singapore. The sequencing process resulted in huge amounts of data and the team of scientists faced a major challenge in analyzing and identifying the thousands of bacterial species found in the aerogenome.

A single run to match a pilot data set of 20,000 DNA sequences against a huge database of some 3 million known sequences the available computing resources in the institute took an entire month. It soon became clear that a totally new type computing infrastructure was required to handle data on this scale.

Working with NUS researchers, the GIS aerogenome data was tested on the TCG@NUS. The entire query was completed in under 2 days, a remarkable improvement compared with the earlier processing time of one month for a single run on an isolated system.

In the area of Digital Media, a ray-tracing program capable of creating three-dimensional photo-realistic images called POV-ray, has been Grid-enabled to run on the TCG@NUS. The image rendering program can be used for design work such as digital arts creation, product and architectural design. As ray-tracing is a time-consuming process, running it in parallel mode, using multiple CPUs to speed up the process, is essential.

Financial modeling is another area that benefits substantially from Grid's multi-processing capabilities. One application tested on the [TCG@NSU](#) was

Structured Product Pricing (SPP) - a Monte Carlo-style simulation application which uses the historical performance data of a fixed set of stocks to derive the best option price of structured financial products. Two option prices are produced, based on the American and European models respectively. In enabling the application, the challenge was to maximise the accuracy of the prediction result through higher number of "paths" and "time steps". The results of the enabling exercise show that SPP gains considerably from being grid-enabled and is able to out-perform any other standalone financial modeling applications.

On PC Grid Computing for Schools

Given the huge number of PCs in each school, the total number of PCs in all the schools (primary, secondary and junior colleges) in aggregation would provide quite a sizeable amount of computational processing power. A conservative estimate gives the number of PCs to be [120,000](#) in Singapore schools.

So the question naturally arises: What could you do with such enormous computing resources?

It was this poser that motivated us to organize the SG@home Ideas Competition in September 2004. The competition aimed to elicit ideas for a grand challenge project that embodied a combination of enticing, educational and cause-worthy factors. Such a project should be computationally massive while at the same time be amenable to being partitioned into many smaller parts so that each component part could be run simultaneously on a PC. The competition was a channel to tap onto the collective creative talents of our students and general public to identify suitable challenges. In all, we received 711 submissions, of which 92% were from Schools, 4% from Institutes of Higher Learning and 4% from the public. There were many creative ideas to implement.

PC Grid Computing for Schools Programme

The SG@Schools (or PC Grid Computing for Schools programme) is jointly organized by Defence Science & Technology Agency (DSTA), Ministry of Education and the National Grid Office. Its purpose is to enable and empower students to develop some of the creative ideas proposed in last year's competition - maybe even suggest new ones to implement – to run on a PC grid to be built using PCs available in schools.

Through this 2-day vacation camp, we hope to introduce the students and teachers to the Grid Computing in general and PC Grids in particular. Two schools will be selected and funded to set up PC Grids using their schools' PCs. They will each be provided guidance and technical support to develop one PC grid application over the next 12 months.

Conclusion

In closing, I would like to thank the National University of Singapore for kindly making the auditorium and computer laboratory available for the training camp, as well as Singapore Computer Systems and Dell Computers for their kind sponsorship.

And now, I am delighted to declare this vacation camp officially open and wish the students and teachers a great learning experience. I look forward to the opportunity to view your own PC grid applications later in 2006.

Thank you.