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Media release

Supercomputing now a reality for SA researchers

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South African researchers now have the advantage of using massive computing power in their quest for new knowledge and application. The Centre for High Performance Computing (CHPC) is the first of its kind in South Africa. Initiated by the Department of Science and Technology (DST), hosted by the University of Cape Town (UCT) and managed by the Meraka Institute of the Council for Scientific and Industrial Research (CSIR), the CHPC is making scientific 'supercomputing' a reality for South Africa.

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Minister of Science and Technology, Mosibudi Mangena, officially opened the facility in Cape Town on Tuesday, the 22nd of May 2007. "The CHPC represents an important step in the modernisation of our South African science infrastructure," he said. "I am confident that this will ensure that we have the requisite capacity to generate new knowledge and cement South Africa's position as an attractive destination for science and technology endeavours."

The high-speed computational infrastructure comprises 160 compute nodes (640 processors) in a clustered architecture. It is rated to have a peak performance of around 2.5 teraflops, in other words, 2.5 million million mathematical operations every second. It is complemented by 50 terabytes of storage space. It compares with the performance of a few thousand standard desktop personal computers.

In order to maximise the benefit and use of this infrastructure, the research communities in South Africa are self-assembled into 10 special interest groups (SIGs), and the CHPC will add a significant computational power to accelerate the research agenda of these groups. More SIGs are currently being convened.

"The facilities at the CHPC provide impetus for researchers throughout southern Africa to engage in a collaborative and multidisciplinary approach to solve complex computationally intensive problems that will make a real difference", said Johan Eksteen, Technology Research Manager at the Meraka Institute.
Some eight years ago, a collaborative high performance computing (HPC) initiative among UCT scientists developed into an informal consortium of Western Cape institutions. The importance of the technology as well as its potential on a national level was also recognised by Government and high performance computing formed part of the national ICT Roadmap Project of the then Department of Arts, Culture, Science and Technology.

In 2003, the DST and the CSIR became formally involved to drive the national agenda and appointed an interim advisory committee involving science councils, higher education institutions, government departments, major national projects, industry players, vendors and international HPC centres.

Deputy Vice-Chancellor of UCT, Professor Cheryl de la Rey said, "As a leading research-led university in South Africa, UCT is proud to be involved with this significant project that has far-reaching implications for research that impacts local and global societies".

While the computational platform was installed only early in 2007, the first three projects have already commenced. These CHPC collaborative flagship projects are:

§ Climate change - UCT, with Professors Bruce Hewitson and Frank Shillington

This project includes an extensive team of participants, and encompasses two complementary sub-projects focused on -

a. multi-model seasonal climate forecasts; and
b. the coupled ocean-atmosphere system.

The two streams share the common application of dynamical modelling of the components of the climate system. The seasonal forecasting stream uses multiple models of the global and African regional climate, and seeks to achieve advances in the value of seasonal forecasts. The second stream will focus on activities addressing research questions of atmosphere-ocean coupling around southern Africa.

§ Cosmology - North-West University, with Professor Marius Potgieter

The project aims to construct, link and expand numerical models in order to simulate, for the first time, the transport and acceleration of charged particles (cosmic rays) from their creation in the Galaxy up to their arrival on Earth. The computer will calculate the acceleration of these particles at astrophysical shocks in supernova remnants, their propagation in the Galaxy and the transport in our local turbulent heliosphere.

§ Materials - University of Limpopo, with Professor Phuti Ngoepe

High-energy density solid-state lithium-ion batteries are increasingly used in commercial applications. With this in mind, the main purpose of this project is to use computational modelling methods in the enhancement of cost effectiveness, energy and power density, charge/discharge time, and the number of charge/discharge cycles of high power rechargeable batteries.

Other typical commercial applications for the CHPC are in the pharmaceutical, chemical and petroleum, software development, mining, automobile and financial and commerce industries. This new facility will be the hub for computational research support and resource supply in Africa.

“The CHPC operates within a multiple stakeholder environment, and is a good example of cross-pollination of a public-private partnership,” according to Dr Happy Sithole, Deputy Director of the CHPC. “The CHPC environment enhances the output of research projects in many ways. In addition to facilitating the development of on-site research laboratories, it also strengthens collaboration with international research communities and promotes partnerships with science councils, research initiatives and experimentalists,” says Sithole.

The Centre for High Performance Computing is an initiative of the Department of Science and Technology, managed by the Meraka Institute of the CSIR and hosted by the University of Cape Town.

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