MURPA Seminar Friday 7 October 2011 at 9am: Cosmological Simulations at the Petascale: Science Results and Operational Challenges

Presenter: Prof Michael L. Norman, Director, San Diego Supercomputer Center, Distinguished Professor of Physics, UC San Diego

Venue: Seminar Room 135, Building 26, Monash University Clayton

Abstract:

Petascale HPC architectures have become available in the US through open-access NSF and DOE national programs. These resources enable computations on an unprecedented scale. We have developed the open-source ENZO community code [1] and the yt toolkit [2] to exploit these resources for applications in numerical astrophysics and cosmology. In this talk I discuss several scientific projects in cosmological structure formation we have carried out recently using 10,000-100,000 cores on various national HPC resources. The data produced by these simulations is enormous, in the multiple 100 TBs per simulation, raising all sorts of operationall issues regarding storage, analysis, and transmission. I discuss these harsh realities of petascale computing and some of the solutions we have developed to cope with these challenges.

[1] ENZO website: http://code.google.com/p/enzo/   [2] yt website:

http://yt.enzotools.org/

Bio

Dr. Michael L. Norman, who was appointed to the position of director of the San Diego Supercomputer Center (SDSC) in September 2010, is a distinguished professor of physics at UC San Diego and a globally recognized astrophysicist. Dr. Norman is a pioneer in using advanced computational methods to explore the universe and its beginnings. In this capacity, he has directed the Laboratory for Computational Astrophysics -- a collaborative effort between UC San Diego and SDSC resulting in the Computational Astrophysics Data Center (CADAC), a free service for the astrophysics community that hosts a public data collection of large astrophysical simulations and provides data-analysis resources worldwide.

Following his appointment as SDSC's chief scientific officer in June 2008, Dr. Norman worked to foster collaborations across the UC San Diego campus for cyberinfrastructure-oriented research, development and education. He also serves as division director of SDSC's Cyberinfrastructure Research, Education and Development (CI-RED).Dr. Norman's work has earned him numerous honors, including Germany's prestigious Alexander von Humboldt Research Prize, the IEEE Sidney Fernbach Award, and several HPCC Challenge Awards. He also is a Fellow of the American Academy of Arts and Sciences, and the American Physical Society. He holds an M.S. and Ph.D. in engineering and applied sciences from UC Davis, and in 1984 completed his post-doctoral work at the Max Planck Institute for Astrophysics in Garching, Germany. From 1986 to 2000, Dr. Norman held numerous positions at the University of Illinois in Urbana, as an NCSA associate director and senior research scientist

under Larry Smarr, currently UC San Diego's director of the California Institute for Telecommunications and Information Technology (Calit2); and as a professor of astronomy. From 1984 to 1986, he was a staff member at Los Alamos National Laboratory.