

Background

iVEC has been providing advanced computing services to the WA research community since its inception in 2000. The iVEC partnership includes the three research intensive universities in WA, CSIRO and Central TAFE and has received over \$5.2 million of state funding to date. In May 2006, the WA Treasurer Eric Ripper announced that the State Government had set aside an additional \$1.95 million a year over the next four years to continue funding iVEC into the next decade. In the business plan for this funding, iVEC has committed to delivering access to its physical infrastructure via grid technologies and e-Research services and is looking to maximise the state government investment by partnering with commonwealth funding agencies in the development of its physical and human infrastructure.

Strategy Going Forward

iVEC's strategy includes:

- The development of first class e-Research infrastructure in Western Australia via the installation of a petabyte scale data storage facility and a series of significant upgrades to the computational, networking and visualization facilities;
- Increasing the human capital necessary to both ensure seamless integration of iVEC's facilities into the National Grid and provide quality user support to users of the iVEC systems; and
- Integrating State key clients, including Government and Industry, into iVEC programs.

Through these steps, iVEC sees demand for these services by the WA research community growing rapidly over the next five years.

Current Application Domains

The major user communities of iVEC are Astrophysics (Gravitational Wave and Radio Astronomy), Bioinformatics, Computational Biology and Biochemistry, Computational Material Science, Computational Chemistry, Computational Geoscience, Computational Physics, Genetic Epidemiology, Remote Sensing, Water Research, and eBusiness.

Many of these communities are to be supported by NCRIS Capability areas. Some notable examples include:

- Radioastronomy, where WA is one of the two shortlisted sites for the \$1.6 billion Square Kilometer Array radio-telescope. Three Professors in Radioastronomy have been appointed in WA, who will be involved in creating the advanced technology required to build such a software telescope as well as undertake the large scale simulations required to understand the results from the telescope.
- Bioinformatics, where iVEC will invest \$300k in 06/07 for the formation of an Informatics Facility. W.A. has also spearheaded the APAC Grid Bioinformatics Project.
- Computational geology, where iVEC possesses the expertise to develop the geoscience community specific interoperability standards required along with the ability to implement the necessary grid infrastructure to achieve a functioning geoscience grid.
- Remote sensing, where iVEC is now storing data from live satellite feeds that cover both the land mass of WA and the ocean off the coast. In the past, this data has all been offline but utilising the iVEC infrastructure this data can now all be accessed almost instantly.

Desired Areas of Strength

iVEC is looking to extend its computational communities to include climate modelling, tsunami modelling, CO₂ sequestration, geothermal modelling, robotics and oil & gas.

Industry and Government Uptake Program

The Industry and Government Uptake Program is responsible for engaging industry and government agencies to encourage the uptake of grid computing, data storage and scientific visualisation directly and through the adoption of e-Research principles. This program commenced in Jun 2005 and has been very successful to date, undertaking nine joint projects with industry/government worth \$1 million. In addition, over twenty formal and twenty-five informal seminars, receptions, demonstrations and talks have been held to promote iVEC's facilities and capabilities to government agencies and industry.

Facilities at January 2004

iVEC initially focussed on visualisation and its HPC capacity at this time was restricted to a 16 processor AlphaServer system rated at 25 GFlops. It had 16 GB of RAM and 320 GB of shared disk. The iVEC staff complement was 5.5 EFT and between 2002 and 2004 there were 30 users on 17 projects.

Facilities at January 2007

iVEC has two primary compute resources totalling almost 2 TFlops:

- A 168 processor SGI Altix system with 336 GB RAM and 10 TB of 500 MB/s disk
- A 164 processor Cray XT3 system with 330 GB RAM and 30 TB of 1.1 GB/s disk

The number of iVEC staff is now 16 and we have 45 project investigators with 127 users.

By June 2007, iVEC will have a third system, a cluster system of at least 1 Tflop bringing the total capacity to 3 Tflops. In addition, a petabyte scale storage facility will be purchased. It is expected that this facility will have a capacity of 0.5 PB at installation and 40 TB of high speed disk at the front end. It is anticipated that this will become a 2 PB system by 2010.

Strategic Relationships

iVEC has a number of strategic relationships with organizations both within Australia and internationally. Firstly the composition of the iVEC partnership is unique within Australia with both CSIRO and Central TAFE as core partners in addition to the universities. This brings a valuable industrial focus to iVEC as well as outreach and training. In addition, our strong relationship with the Department of Industry and Resources has contributed to our successful refunding.

iVEC has significant strategic relationships with many State Centres of Excellence as well as most of the Cooperative Research Centres headquartered in WA. iVEC is a core participant in three proposed State Centres of Excellence, two in multiscale modelling and one in radioastronomy. Finally, iVEC has signed a MoU with ISA Technologies, an independent consultancy and specialist technical company that provides Supercomputing On Demand as well as other IT related services. The agreement allows iVEC partner organisations to access the facilities at ISA Technologies for specific projects that fall under the auspices of iVEC.

Nationally, iVEC has strategic relationships with the pmd*CRG, which has computational geoscience as a core program and the AcCESS MNRF. iVEC researchers are driving the SEE Grid, which is bringing together people in the earth, environmental and computing sciences to address the issues of "transparent access" to data and knowledge about the earth, and the available and potential technologies offered by the grid that enhance the ability to explore for and manage Australia's natural and mineral resources. iVEC is also involved in a research consortium with the ATNF. iVEC has built very strong links with the CSIRO HPSC, resulting in them coinvesting in iVEC's HPC resources as well as directly networking the two sites at 1 Gbps.

Internationally, iVEC has formed alliances with the Cray Users Group, the Swiss National Computing Centre, the University of New Mexico, and the Pacific Rim Regional Visualisation and Analytics Center (PARVAC). iVEC is part of the HIT lab New Zealand Consortia and has strong links with the eScience program of the EPSRC in the UK through computational chemistry and geology as well as eBusiness. A group of iVEC researchers are consultants with Accelrys Inc, the worlds leading materials modelling company whilst another is the co-Chair of the International Wheat Genome Sequencing Consortium (USA, France, China). Finally iVEC is collaborating with NASA, porting some of our codes to their Columbia system.