

QCIF contributions to NCRIS Platforms for Collaboration

(B. Pailthorpe, Oct 30 2006)

QCIF Ltd is an independent company that provides cyber-infrastructure and related services in Queensland. Its founding members are six of the Queensland universities (UQ, QUT, Griffith, JCU, CQU and USQ). In May 2006, the organisation changed its name from the long-used QPSF.

The mission of QCIF is to deploy and support advanced computing infrastructure to support Queensland's Researchers and Industry.

QCIF directly supports 335 researchers across some 80 R&D projects, with another 100 researchers using related HPC resources (p2). It provides data services to QFAB and the ACcESS MNRF. Some projects are documented at: <http://www.qcif.edu.au/research/>.

Applications domains

User support spans Computational Science and Computational Engineering, with a focus on:

- Bio-sciences, bio-informatics, computational chemistry
- Engineering & geo-sciences,
 - with particular application to mining industry and associated supporting engineering enterprises
 - computational earth systems science is with links to ACcESS MNRF and pmd*CRC.
- Ecological sciences (including marine and tropical sciences), with emerging strength in eco-informatics,
- environmental sensing (SensorNets), in collaboration with AIMS.

QCIF operates a Technology Diffusion program that has focused on sustained engagement with a broad range of Queensland industries, including SMEs, and joint initiatives with State Government Departments. The program has operated by seeding relatively small demonstration projects (< \$50k; duration 3-6 mo; start-up in 2-4 wks) that are of limited scope, agile, and able to respond to near-term industry opportunities. Some projects are highlighted at <http://www.qcif.edu.au/industry/>. The program will double in scope from 2007 and will adopt a more systematic approach to engaging with a broader range of SMEs.

e-Research

QCIF researchers host 11 of the current 37 ARC e-Research grants, and are engaged with a number of related ARIIC projects (eg. DART, ARCHER, MAMS, APSR). QCIF staff initiated the Access Grid in Australia (as well as on the US west coast) and leads the national support and R&D (jointly with ANL; and with CalIT2 for HDV) efforts. QCIF supports data services, including SRB, and leads the APAC Portals development effort. QCIF is the nominated cooperative vehicle for e-Research support in Queensland.

Scientific data

QCIF is one of the initial pillars of an emerging Australian scientific Data Grid - at UQ, ANUSF, Monash, JCU, UTas and UWA, (along with CSIRO/BoM) – in that each already have in place quite substantial data archival capacity (eg. StorageTek tape robots, staff & emerging data services, etc), funded by universities, ARC, APAC, QCIF, etc. This combined data capacity is approximately 5,000 TeraBytes (TB), with > 500 TB under active management.

We, being the first three sites at least, are now working in a coordinated manner, having won two successive ARC LIEF grants to provide upgrades of ~ 100 TB each pa. Those 3 sites are installing



high performance data access servers in 2007. QCIF directly supports data needs of IMOS (NCRIS 5.12 & AIMS), QFAB and ACcESS MNRF.

Services:

- HPS systems support; grid AAA; data archives & support, SRB, Workflows, Portals, User Interfaces; SensorNets & Tele-instrumentation (CIMA)
- APAC NF user support, Parallel programming (MPI), Specialist user support for bio-informatics, geo-sciences, chemistry, physics
- Access Grid support & leads Australian AG development effort

HPC Resources:

QCIF and partners' HPC and supercomputers are distributed across 4 sites, comprising a total of ~1,300 processors with an aggregate peak speed of ~ 4 Tflops.

UQ: sgi *Altix* 3700 supercomputers (132-proc); StorageTek PowderHorn Tape archive (populated at 220TB, with 1,200TB capacity); 15 TB disc; sgi DMF HSM; ViSAC visionarium, 5 x Access Grid nodes; along with the ACcESS MNRF *Altix* (208-proc); three clusters (128- 256- & 100-proc – for Chemistry, Physics, IMB) and a IBM P-690 data engine at IMB. APAC grid gateway.

Griffith 2 SUN clusters (128-proc opteron, 64-proc UltraSPARC), 60 TB disk; 3D wedge VR system; 2x AG nodes (Nathan & Gold Coast).

QUT: sgi Origin 3400 (128-proc), 5 x AG nodes (3 in Gardens Point; Kelvin Grove, Caboolture campus)

JCU sgi *altix* (94 proc), SUN clusters (156 proc Opteron), 4 x AG nodes (3 in Townsville, Cairns); 95 TB StorageTek L180 Silo with DMF.

Other regional AG nodes are located in Rockhampton, Gladstone and Toowoomba (CQU & USQ).

Currently QCIF is upgrading its data capacity at 100TB pa (tapes, matched ~10% disc), often with substantial ARC LIEF funding. The QUT system is undergoing a >100% upgrade in 2006, while the UQ will likely have a 200% upgrade in 2007; aggregate compute capacity is expected to double in the next 2 years.

Major data holdings are for: bio-informatics, spectroscopy (MRI (CMR) and presently crystallography), geo-sciences, marine sciences, satellite imaging, health sciences (MRI, immunology), with data services to AusVO and social sciences.

Strategic Relationships include:

Qld Govt: Development of State Development, Dept Natural Resources, Mining and Water; Information Industries Bureau, QFAB.

University Institutes: Institute of Molecular Biosciences (IMB - UQ), Centre for Molecular Simulations (CMS - UQ), Centre for magnetic resonance (CMR, UQ), Australian Institute for Bioengineering and Nanotechnology (AIBN – UQ), Centre for Glycomics (GU), Institute for Health and Biomedical Innovation (QUT), ARC Centre for Excellence in Coral Reef Studies (JCU), ARC Centre for Bioinformatics (UQ), ARC Centre for Complex Systems (UQ), pmd*CRC , Railways CRC (CQU & QUT), Creative Industries CRC (QUT).

National Organisations: ACcESS MNRF; Australian Institute of Marine Science (AIMS); AusVO, MTSRF (successor to the Rainforest & Reef CRCs); Molecular and Molecular Sciences Network (ARC Research Network); Sensor Networks (ARC RN); DART (ARIIC Project); Australian Institute for Commercialisation (AIC).

International: San Diego Supercomputer Centre (SDSC) – SRB group (R. Moore); Argonne National Lab – AG & Display groups, MCS Division; Indiana U (R McMullen – CIMA); CalIT2 / SIO – SensorNet projects, Data/Control rooms (HDV); NSF – participation in US planning meetings (both via AG and on-site); NSF-NARA working party for the preservation of scientific data; PRAGMA - co-hosted (with APAC) 10th meeting; UK e-Science program.