

UQ SMP Core Computing Facility



Australian Government

Australian Research Council

Dr. Michael Bromley - ARC Future Fellow

Overview

- National Facilities
- UQ / QCIF / RCC systems
- Faculty of Science IT facility
- SMP core computing facility – current
- SMP core computing facility – near future

About Me

- BSc – Physics, Computer Science
- Undergrad traineeship in Unix Software/Database Development (Sun/Mosaic/Sybase/perl)
- Graduate traineeship in Local/Wide Area Networking, mostly Cisco routers/switches
- Ph.D. In computational/theoretical physics (N.T.U.)
Large scale (sparse) eigenproblems
- Faculty at San Diego State University (USA)
-> NSF grant to setup rack cluster there
- Future Fellowship on Atom interferometry and interactions via HPC. Researching non-linear PDEs / more eigenproblems



- UQ Research Computing Centre established in 2011 under Office of the Deputy Vice-Chancellor Research
- <http://www.rcc.uq.edu.au/>
- Operates various systems including for QCIF - The Queensland Cyber Infrastructure Foundation
- Barrine – 3000+ cores SGI based system 2010-mid 2014
most 2 x Intel L5520 4 cores @ 2.26 GHz (2009) at 24 GB RAM
some 4 x Intel X7550 8 cores @ 2.00 GHz (2010) upto 1024 GB RAM
- QCloud - The Queensland Node for NeCTAR and RDSI
- New ARC-LIEF funded system coming soon:
FlashLite isn't that specific yet .. think a couple of thousand core, quite a lot of main memory, lots of flash



Faculty of Science IT

- Responsible for all of the Schools across the faculty
- Old machines alpha/beta/gamma... compton
- Two compute (blade) servers smp-comp01 / smp-comp02
4 x Intel X5690 6 core 3.47 GHz (2011) with 96 GB RAM
- Qcloud Windows Compute: uqscicomp01.qern.qcif.edu.au
- smp-ts01.smp.uq.edu.au - Windows Remote Desktop

SMP Clusters - ghost

- Holger Baumgardt's Future Fellowship GPU Clusters
- Purchase starting in 2010 \$117K ex-GST
- One whole Rack... Xenon Nitro T5 with 34 Tesla GPUs
- 10 nodes 4U... 120 cores Intel X5650 @ 2.66GHz (2010)
- 7 nodes have 4 x Nvidia Tesla C1060
- 3 nodes have 2 x Nvidia Tesla C1060

- Recently out of warranty but will be added to new obelix system

SMP Clusters – asterix

- asterix or 'smp-gpu01', purchased 2011, \$193K ex-GST
- bought with UQ Major Equipment and Infrastructure Grant inc. \$70K matching Science/SMP funds (PIs included Anthony Roberts, Matthew Davis, etc).
- One whole Rack... Xenon Nitro T5 with 40 GPUs
- 15 nodes .. 120 cores Intel X5650 @ 2.40GHz (2010)
- Total of 10 x Nvidia Tesla C2070 (max 2 / node)
- Total of 30 x Nvidia Tesla C2050 (max 4 / node)

- Has a master node and SGE queuing system. Will merge into new obelix.

SMP Clusters – obelix

- obelix or 'smp-cluster1', purchased 2012, \$200K ex-GST
 - * Future Fellowships (Kherunstyran/Bromley),
 - * EQUUS (McCulloch/Milburn/Stace),
 - * CAMS (CoE antimatter via Mitroy),
 - * UQ ECR grant (Parkinson),
 - * small \$3K contribution from the school
- One whole Rack... Dell based with 616 cores total
- Mostly 7 Dell PowerEdge C6220 (with 28 nodes)
each node 2 x Intel E5-2660 2.2GHz (2012) 196GB RAM
- Some other machines (small.q and kanuka.q)
- +1 rack maui.q and tensor.q = 112 AMD opteron cores
- Has a master node and SGE queue and 1Gb

SMP Clusters – obelix upgrade

- obelix upgrade via SMP Strategic Funds \$236K ex-GST (plus \$24K Bromley Future Fellowship)
- Upgrade has 3 parts:
 1. Network based on two PowerConnect 8164
 - * upgrade cluster to 10Gb Ethernet from 1Gb
 - * switches linked at 40Gb fibre
 2. NFS Disk storage no longer off the master PowerVault MD3660i served by two PowerEdge 720 48 1.2TB 10K RPM SAS 6Gbps 2.5in Hot-plug Hard Drive existing 2 x MD1200 disk arrays will be daisy-chained

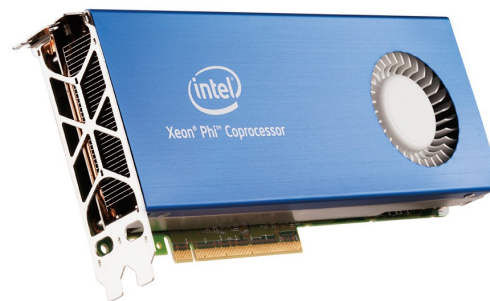
SMP Clusters – obelix upgrade

- 3. Lots more compute power in three parts:
- (a) 128 more cores as per obelix: 8 more C6220 nodes each node 2 x Intel E5-2660 2.2GHz (2012) 196GB RAM
- Then we are buying 8 C8220X compute nodes each can fit two compute cards:
- 6 x NVIDIA Tesla K20 GPU each with 1 Kepler GK110 2496 CUDA cores - 1.17 Tflops at 5GB GDDR5 RAM 225 Watts



SMP Clusters – obelix upgrade

- 8 x Intel Xeon Phi coprocessor 7120P
- Intel Many Integrated Core Architecture or Intel MIC
- x86-compatible multiprocessor architecture OpenMP, OpenCL, Cilk/Cilk Plus and Intel's Fortran, C++ and MKL
- each with 61 cores at 1.238 GHz, 16GB RAM @ 352 GB/s
- 300 Watts



SMP Clusters – access

- To get access just log a job with Science IT
`https://it.science.uq.edu.au/helpdesk/`