

The 5th CSIR **CONFERENCE**

IDEAS THAT WORK

8-9 October 2015 | CSIR ICC

Cyberinfrastructure for international competitiveness

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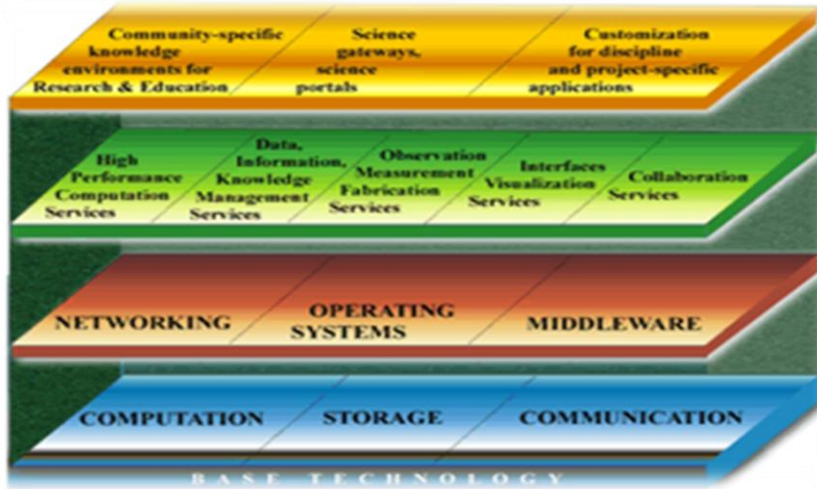
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What is Cyberinfrastructure

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- South African National Research Network (SANReN): provides high speed networks and services.
- Center for High Performance Computing: (CHPC) provides massive parallel processing capabilities.
- Data Intensive Research Initiative of South Africa (DIRISA): provides tools and facilities for data driven S&E discoveries.
- All these facilities and services are:
 - Complemented by comprehensive skills development initiatives
 - A departure from normal business to accelerate time of discovery or development

Status of SANReN



- Approximately 1 Million users (researchers, educators and students) use SANReN daily.
- 10 Gbps core network, 4 major metro networks, 151 sites with primary 1 Gbps/10 Gbps fibre connectivity; SEACOM and WACS connectivity.
- All main campuses of SA universities; research councils e.g. CSIR; ARC, SAWS, SKA core sites and SANAP.
- Average bandwidth available per site: 2.82 Gbps.
- Developed advanced services (e.g. eduroam, LightPaths, perfSONAR).
- HCD and research in broadband technologies.

Status of CHPC

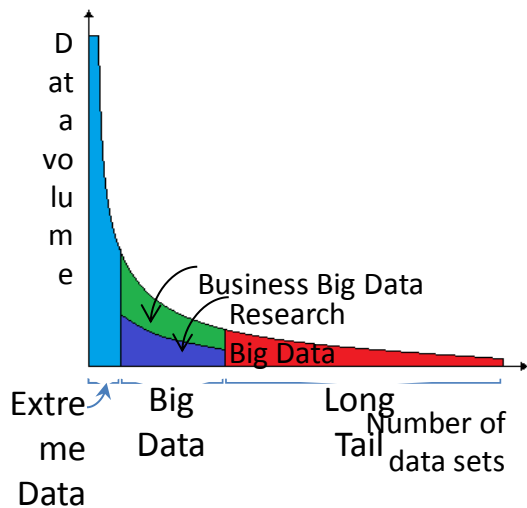


- Hybrid cluster capable of 61.4 TFLOPS processing capabilities, and currently upgraded to 1 PFLOP
- Achieved 92.4% uptime with utilisation of over 80%.
- Provide the services to over 700 researchers from academia and industry
- Facilities used as test-bed for SKA-SDP
- Provide fail-over service for South African Weather Services
- Industry users at CHPC (SASOL, TOTAL, DeBeers, etc.) – high fidelity simulation and modelling such as CFD, FED, etc.) to improve competitiveness
- Comprehensive HCD and training initiatives in HPC and domain specific needs

Status of DIRISA



- 4 PB of storage available for the research community
- 2 PB fully synchronised between Pretoria and Cape Town campuses of the CSIR
- Initial project as a form of feasibility study to DST
- Currently the funding for DIRISA in the range of R20 million to enable data discoveries
- Increased awareness in institutions with more initiatives to implement DIRISA supporting initiatives



Success stories

- The reduction of bandwidth costs in the country (national and international connectivity)
- Played critical role in demonstrating the preparedness of South Africa in hosting the SKA.
- Tier-2 facility producing 2 400 jobs/day for the ALICE experiment.
- HCD program producing world-class skills demonstrated by the success of Student Cluster Challenge championship 2 years in a row and 2nd place in 2015.
- Increasing industry uptake of HPC.
- Increase in publications from South African researchers and graduations in HPC related fields.

Bandwidth Price Competitiveness

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Prior to SANReN initiative

- HEIST (1Mbps per month) – R43 000
- GEN2 (1Mbps per month) – R16 000
- GEN3 (1 Mbps per month) – R14 000

With the SANReN initiative

- SANReN (**1 Gbps** per month) – R6 100
- SANReN (**10 Gbps** per month) – R12 200

International Price Competitiveness

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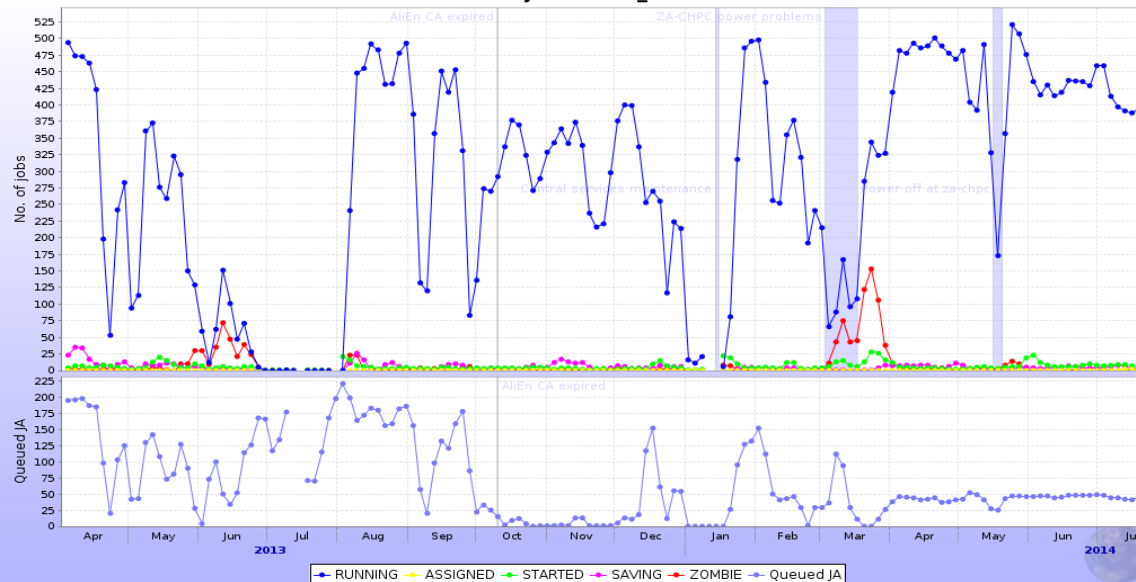
Start Date	Platform	Charge per Mbps/month
2001-03-01	Satellite	R52,425
2007-04-01	SAT-3	R21,025
2008-01-01	SAT-3	R 15,045
2008-06-01	SAT-3	R14,245
2009-10-01	SAT-3	R13,375
2010-01-01	SEACOM	R1,380
2011-01-01	SEACOM	R1,380
2014-02-25	SEACOM + WACS (10G leased by TENET)	R2,228
Now	SEACOM + WACS (44,6Gbps, growing to over 400Gbps, procured through DST funding)	R1,073

CERN Contribution



- Support for CERN experiments (ALICE and ATLAS)
- Currently providing support for 2 400 jobs/day.
- Plans to move to WACS cable for better international connectivity.
- Officially signed the MOU for a Tier-2 facility in April 2015.
- Plans to expand the service for Tier-1 in future.
- An important testimony for the hosting of SKA data and services for international community.

Active jobs in ZA_CHPC



Student Cluster Championship

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- The student cluster challenge is aimed at developing HPC skills at early age
- On average 50 students trained in June locally
- 8 – 10 teams (4 students each) enter the national competition
- A team of six selected to represent South Africa in International challenge
- 2013, 2014 champions and 2nd price in 2015.
- Attracted Dell to invest R120 Million over 10 years
- Other companies such as Mellanox, CRAY, Eclipse, HP, BMW provide support

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South African industry in HPC

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What are the Drivers?

- ▶ Highly scalable methods for modelling and simulation exploit massive parallelism and data visualisation.
- ▶ Heterogeneous computing environments require new programming models..
- ▶ Emerging real-time, data-intensive applications require robust HPC capability.
- ▶ Energy requirements increase industry overheads.
- ▶ Tax incentive models from government.

- SASOL
- De Beers
- Johnson Matthey
- ESKOM
- XTRATA
- ECJIV
- NNR
- TOTAL
- MINTEK
- HATCH

Virtual Prototypes

Boeing reduced 787 Dreamliner prototypes from **77** to **11**

- ▶ Applications are made to scale.
- ▶ HPC is accessible to businesses and applications of all types.
- ▶ HPC is effectively utilised.
- ▶ Easier to migrate applications to other HPC systems.

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Thank you

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