

National Computational Infrastructure, Australia
Presentation proposal to TNC18
June 10-14th 2018, Trondheim, Norway

Session Title: Global Big Data and Compute at 100G
Presentation Title: Big Data and Computing at Global scales

Keywords

100G International ESA EUMETSAT NCI ANU GeoScience Australia Sentinel TEIN

Submission summary

Data from the ESA Sentinel satellites which make up the Copernicus Earth Observation platform is rapidly being integrated into a variety of applications and services used throughout the Asia Pacific region.

The regional hub operated by NCI in Australia, supports the rapid dissemination of Sentinel mission data to Asia, Australian, New Zealand and the Pacific nations.

Each Sentinel mission supports two spacecraft which are capable of observing every part of the planet every week using radar, high resolution multispectral imaging, atmospheric composition and sea surface height measurement. Building over time, a highly detailed view of our changing planet.

Transferring the data from Europe to the Australian regional hub requires crossing many network and organisational domains.

This presentation discusses the lessons learned in the journey to deliver a mission critical data service at global scales and describes the techniques used and how they build upon the pioneering InfiniCortex data transfer systems but using the next generation of 100G R&E network services.

Presenters:

Andrew Howard - NCI, Australian
Artur Binczewski - PSNC, Poland

ICM University of Warsaw
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Presentation Title:

InfiniCortex 2.0: Convergence and integration of global scale research networking; big data generation, flow, storage and processing; HPC and software tools.

Keywords

InfiniCortex, International Global Collaborations, Data Transfer Nodes, HPC, Big Data, transfer tools and protocols

Submission summary

Over the last four years InfiniCortex collaboration¹ has successfully demonstrated InfiniCortex concept and test-bed infrastructure^{2 3 4 5 6 7}, as a globally distributed concurrent supercomputing resource spanning four continents and up-to seven countries, and connected with high bandwidth and high throughput global InfiniBand network.

Here we report on our efforts to further expand this global collaboration and our activities towards establishing permanent global big data and compute infrastructure.

The original Infinicortex construct, which relied heavily on global InfiniBand connectivity is now relaxed and re-engineered to work equally well with

¹ The driving partners, among many other participating organisations, were: A*CRC and NSCC, Singapore; NCI Australia, and PSNC and ICM Poland; multiple NRENs: Pionier, Geant, NourduNet, SURFnet, Canarie, Starlight and SCLnet - for the full list of partners see references below.

² Marek T. Michalewicz, David Southwell, Tan Tin Wee, Yves Poppe, Scott Klasky, Yuefan Deng, Matthew Wolf, Manish Parashar, Tahsin Kurc, C.S. Choong-Seock Chang, Satoshi Matsuoka, Shin'ichi Miura, Jakub Chrzęszczyk, Andrew Howard, „InfiniCortex: concurrent supercomputing across the globe utilising trans-continental InfiniBand and Galaxy of Supercomputers”, Conference Paper · Conference: Supercomputing 2014: The International Conference for High Performance Computing, Networking, Storage and Analysis, At New Orleans, LA, USA November 2014, DOI: 10.13140/2.1.3267.7444, 70 pages

³ Marek T. Michalewicz, Tan Geok Lian, Lim Seng, Jonathan Low, David Southwell, Jason Gunthorpe, Gabriel Noaje, Dominic Chien, Yves Poppe, Jakub Chrzęszczyk, Andrew Howard, Tan Tin Wee, Liou Sing-Wu, „InfiniCortex: Present and Future”, CF '16 Proceedings of the ACM International Conference on Computing Frontiers, Pages 267-273, Como, Italy — May 16 - 19, 2016, [ACM](#) New York, NY, USA ISBN: 978-1-4503-4128-8 doi>[10.1145/2903150.2912887](https://doi.org/10.1145/2903150.2912887)

⁴ Gabriel Noaje, Alan Davis, Jonathan Low, Lim Seng, Tan Geok Lian, Łukasz P. Orłowski, Dominic Chien, Liou Sing-Wu, Tan Tin Wee, Yves Poppe, Ban Hon Kim Kenneth, Andrew Howard, David Southwell, Jason Gunthorpe, Marek T. Michalewicz, “InfiniCortex - From Proof-of-Concept to Production”, Supercomputing Frontiers and Innovations, 87-102, Vol. 4 no. 2 (2017)

⁵ Kenneth Hon Kim Ban, Jakub Chrzęszczyk, Andrew Howard, Dongyang Li, and Tin Wee Tan. “InfniCloud: Leveraging the global InfniCortex fabric and openstack cloud for borderless high performance computing of genomic data”. Supercomputing Frontiers and Innovations, 2(3):14 27, 2015. DOI:10.14529/js 150302

⁶ Jakub Chrzęszczyk, Andrew Howard, Andrzej Chrzęszczyk, Ben Swift, Peter Davis, Jonathan Low, Tin Wee Tan, and Kenneth Ban. “Infnicloud 2.0: distributing high performance computing across continents”. Supercomputing Frontiers and Innovations, 3(2):54 71, 2016. DOI:10.14529/js 160204

⁷ Jonathan Low, Jakub Chrzęszczyk, Andrew Howard, and Andrzej Chrzęszczyk. “Performance assessment of InfniBand hpc cloud instances on intel haswell and intel sandy bridge architectures”. Supercomputing Frontiers and Innovations, 2(3):28 40, 2015. DOI:10.14529/js 150303

multitude of communication protocols. In recent demonstration at SC17 in Denver we have conducted further experiments with new technology and new challenges. Our collaboration with USA (Northwestern University), Singapore (NSCC and A*CRC) and Australia (NCI), allowed us to join 100G global network of Data Transfer Nodes, which enabled us to transfer huge amounts of data between HPC systems using variety of protocols.

Also Inter-Data Center Network of 1,2 Tb/s moves global supercomputing project a step forward.

Presenters:

Jaroslaw Skomial - University of Warsaw, ICM