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Development and deployment of distributed e-VLBI components

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Overview (For the conference guide)

Engineering Research Institute Ventspils International Radio Astronomy Centre of Ventspils University College (VIRAC) is participant in several Very Large Baseline Interferometry (VLBI) networks, notable European VLBI Network (EVN). Data processing is of high significance for whole VLBI measurement, it requires considerable amount of computational power. Accordingly was developed data processing system which computes observations' results on several High Performance Computers. Recent trends are towards a real time data processing, so called e-VLBI, with several advantages when compared to traditional delayed data processing, for example allows dynamic detection of transient events in skies.

KEYWORDS: Radioastronomy, Very Large Baseline Interferometry, VLBI data correlator, e-VLBI

Description of the Work

Large amount of data from sessions are processed in a shared e-VLBI infrastructure developed by EU FP7 EXPReS (and recently NEXPReS) projects. The main e-VLBI software components are: distributed software FX correlator (SFXC), VLBI Broker, Translation Nodes and WorkFlow manager. The major CPU power is consumed by data cross-correlation from different radio telescopes. In order to fulfill e-VLBI goal - process a session data in a real time SFXC correlator has to be executed on a high performance computer cluster, where it uses parallel programming technologies based on Message Passing Interface (MPI). Several SFXC installations can be assembled in the distributed e-VLBI correlator which is in the development phase. At the moment SFXC installations are deployed at VIRAC High Performance Computer (HPC), at JIVE (Joint Institute for VLBI in Europe) HPC and at PSNC (Poznan Supercomputing and Network Centre).

Conclusions

The main goal is to develop and implement a distributed version of software correlation and others e-VLBI components which automate VLBI observations, data workflow and data processing. Until now VIRAC take a part in VLBI observations in several European radio telescope networks using developed distributed e-VLBI system beta version and grid technologies. We have performed an experiment with a distributed e-VLBI component, running on three separate HPC. We are on a road towards to full e-VLBI distributed correlation system implementation per annum.

Impact

The e-VLBI system allows astronomers to plan, execute and monitor their observations. e-VLBI system advantage is to identify and correct problems during an observation. Distributed processing system allows realize

data processing more efficient using several HPC which mean that more data can be correlated faster. Computing in a shared infrastructure is developed using Grid computing technologies which allow real time stream processing on a distributed e-VLBI system.

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