Software frameworks for SKA pathfinders

Editor: Ronald Nijboer

Presenter: Ronald Nijboer

Attendees

- Danny Jacobs – PAPER
- Francois Viallefond – ALMA
- Ger van Diepen – ASTRON / LOFAR
- Duncan Hall – SPDO
- Ruby van Rooijen – MeerKAT
- Eric Greisen – NRAO
- Frazer Owen – NRAO
- Ronald Nijboer – ASTRON / LOFAR
- Gareth Hunt – NRAO
- Simon Ratcliffe – MeerKAT
- Danielle Fenech - eMERLIN

Relevant presentations

- V.N. Pandey – DPPP and BBS for MSSS
- Anita Richards – Requirements for astronomer steered pipelines using VO techniques
- Danielle Fenech – Data reduction pipelining for e-Merlin
- Aaron Parsons – … Paper array using AIPY

Other presentations of relevance

- Stephen Ord – MWA Imaging and data products
- Oleg Smirnov – MeqTrees and Calibration
- Jan Noordam – ccc-networks: …
- Sanjay Bhatnagar – High dynamic range imaging: …
- Tim Cornwell – Parallelization of ASKAP Calibration and Imaging

Other presentations of relevance (2)

- Maxim Voronkov – Mosaicing and faceting in ASKAPSoft
- Simon Ratcliffe – Stream based data processing for RA
- Bill Cotton – Parallelization of common …
- Duncan Hall – Software experiences from industry
- Robert Laing – Oxford meeting on algorithms

Types of data processing

- Pipelined data processing
  - Push button: “go”
  - Final SKA
- User assisted processing
  - Decomposed in sub-problems (“scripts strung together”)
  - Can be stopped in between
  - Used for learning
- Processing by expert
  - Don’t trust anyone with your data
- Processing by algorithm / strategy developer
  - Get their hands inside the code

Software packages

- Classic AIPS
- Obit
- CASA (AIPS++)
- Miriad
- NEWSTAR
- DIFMAP
- Gildas
- AIPY
- MeqTrees
- BBS
- CImager / Duchamp

- Python interfaces: ParselTongue, ObitTalk, CasaPy, PyRAP, …

- CasaCore

Inventory

Telescope	Software	I/O Data format
MeerKAT	Use best software modules available	Database to a package; streamed data
ASKAP	Dedicated Cal, CImager, (Duchamp), CasaCore	MS, CASA images
ATA	CASA, AIPS ?	?
LOFAR	DPPP, BBS, CImager, SF CasaCore	MS, CASA images, HDF5 Images
Apertif	LOFAR Software?	
MWA	Own software?	?
LWA	CASA?	?? FITS IDI
EVLA	CASA (+ AIPS / Obit)	MS or FITS
eMERLIN	AIPS / Obit and later CASA	FITS or MS
eEVN	AIPS, ParselTongue, DIFMAP	FITS IDI

Inventory

Telescope	Software	I/O Data format
Paper	AIPY	Miriad files
ALMA	CASA	MS, CASA images FITS
VLBA (upgrade)	AIPS	FITS based
GMRT	AIPS	UVFits, UVTables (?), FITS Images

Issues: documentation

- Central point for memo series
  - Database?
  - Ordered by topic? Search function?
  - Algorithm + use case+ constraints
  - Papers + memos do not explain the nitty gritty details for re-implementation
  - SPDO
- Information exchange

Other issues

- Parallelization, distribution, data volume
- Data format (read / write)
  - Visibilities, images
  - Meta data
  - Internal vs. external (from archive) data formats
  - FITS for export of images
  - UV data is harder
- Meta data: flags (flag bits)
- Data compression
  - E.g. baseline dependent averaging
  - Image compression on post stamps
- Interoperability
  - ALBiUS
- Automatic pipelines

Relevance to the SKA

- We have lead time towards the SKA for learning
- Interoperability for the learning process
  - Not necessarily for the final product
- Multiple platforms, but not too many
  - Less risks of mistakes
- Can we cope with the pathfinder data volumes?
- Look at the pathfinders for “solutions”
  - SKA requirements are not final