Minutes of Meeting LOFAR Software

Date:	2008-04-16
Next meeting:	2008-04-23 9:15-10:15
	Paviljoen West room
Present:	
Andre Gunst	Yes
Ronald Nijboer	Yes
Ruud Overeem	Yes
John Romein	Yes
Michael Wise	No

cc: Arthur Coolen, Jurjen Sluman, Pieter Donker, Chris Broekema, Martin Gels, Joris v. Zwieten, Marcel Loose, Adriaan Renting, Ger van Diepen, Max Avruch, Peter Boonstoppel, Michiel v. Haarlem, Jan Reitsma, Ger de Bruyn, Arno Schoenmaker, Hanno Holties, Corina Vogt, Jan Noordam, Joe Masters, Lars Bähren, Dion Kant, Johan Hamaker, Maaijke Mevius

Remarks previous minutes

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Announcements

- A new machine for LOFAR17 is arrived. This will be the new build machine.
- The WAN procurement is finished. A company selected.
- A decision is made to rotate the HBA dipoles in the tile.
- Holidays:
    - Ruud: first two weeks of July (29 Juni – 14 Juli 2008)
    - John: in May 2 weeks and from ~26 August 3 weeks and structural one day off from ~26 August onwards.
    - Ronald: 19 May to 23 May and from 25 August to 12 September
    - Andre: July
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Action item overview

ID	Date submitted	Description	Owner	Planned date	Status
49	20080116	Simultaneous data storage of TBB and in OLAP to validate inverse poly phase filter bank of Kalpana. Dataformat should be changed. A new format was defined. For multiple beams something in the format needs to be changed. Planned Thursday.	John/Andre	20080204	Ongoing
53	200080206	Estimation of work if CS1 is scaled up to 20 stations. See the section before the decisions in the minutes.	John, Ruud, Ronald	20080227	Open

Last: 54

Progress

Stations (André):

Achieved since last meeting:

- Eric's investigation already resulted in an increment of the total number of beamlets from 54 to 62.
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Problems / current activities:

- Long distance delay tracking is not tested again. No fringe yet. Possible help could be to use the raw data from the TBBs.
- Eric Kooistra is busy investigating the feasibility to increase the number of station output beams with a factor of 4. The penalty is that the amount of output bits is decreased from 16 to 4 bit as well.

Next actions:

- Step 5

OLAP (John):

Achieved since last meeting:

- John has access to the BG/P in Argon. The correlator works now, however one of the assembly instructions does not work. In the BG/P the correlator software architecture needs to be changed to make optimal use of the resources. Currently it uses 92% of the processing resources. For the BG/P we need probably 1 rack for 64 stations and 32 MHz bandwidth. An extra rack is required for correlating full LOFAR. The number of 10 GbE links per rack is 64. Each IO node should be 4 times faster than the BG/L. This needs to be proven. Currently the rate of a 10 GbE link is 1.5 Gbps. More study needs to be done to increase this.
- The online bandpass removal is implemented.
- The Kalpana experiment is executed.

Problems / current activities:

- Chris is working on the CEP white paper.
- Martin is a busy with non micro station mode. A quarter of the band is processed by separate partitions. This does support multiple modes at the same time (tied array and correlation). For this reason we also need single partition. A disadvantage of one partition is that if hardware fails than the system hangs (system is not fault tolerant against failing hardware).
- Robustness for failing disks is not included yet (Arnold Meijsters).

Next actions:

- Step 5

Offline pipeline (Ronald):

Achieved since last meeting:

- Pandey measured the bandpass stability (0.1 % stable over 24 hours).
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Problems / current activities:

- Marcel and Joris made progress on the global solver framework.
- Ger is writing a converter to convert the LOFAR parset format (distributed by SAS/MAC) and CONRAD parset.
- The distributed imager has problems with 64 bit machines (low priority).
- Open tasks which are not assigned yet due to lack of people:
    - documentation of the imager,
    - profiling of the imager,
    - speed up of the BBS parameter database (question: is this the bottle neck?),
    - global sky model,
    - station beam modeling and validation (LBA and HBA),
    - flagger
    - source finding
- Maaijke is ready to start implementing an ionospheric model, but it is not clear yet which model to implement. It is wise to implement a framework wherein the model can be included.

Next actions:

- Step 5

SAS + MAC + SHM (Ruud):

Achieved since last meeting:

- One day of the week the observatory is testing the MAC/SAS system.
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Problems / current activities:

- Pieter is busy to implement the LBA station calibration. Standard matrix functions will be implemented in Blitz arrays. Blitz is more likely faster than Boots arrays and a lot of functions are already built in Blitz by Marcel.
- Extra status registers which are implemented in the FPGAs are not driven yet by the LCU.
- Reading back the HBA delays should result in really reading back those values from the Front End (FE) units instead of reading back what was written to the FEs.
- Arthur is working on Navigator 2.0 screens (Step 5).

Next actions:

- Step 5

User Software (Michael):

Achieved since last meeting:

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Problems / current activities:

- Alexander writes a requirements document for the mosaicing feature.
- Lars is busy with the near field imager (skymapper).
- Joe started working on the hooks in DAL to include metadata (some of the metadata should end up in the header of the dataproducts).
- Alexander is checking how much work is required to connect DAL to CASA core for using the HDF5 data format.

Next actions:

- Step 5

Software integration

Achieved since last meeting:

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Problems / current activities:

- A request of Michiel Brentjes was to keep a clean trunk. John suggests to tag the production release.
- Marcel is busy with streamlining the build environment
- Compile a list of anticipated data products and calibration or metadata files associated with each of the pipelines.
- LOFAR development software needs to be build in Kubuntu (Michael has volunteered)

Next actions:

- Define the length of Step 4.
- Step 2+: A test program will be initiated to verify the functioning of the LOFAR software in a more structured way. In OLAP it is possible to store the raw station data and feed this into the pipeline later on. This makes it possible to define a standard data set, which can be applied to the pipeline as soon as major software changes have been taken place.

Scaling up work for 20 stations

Stations:

- For the stations the split HBA field boards must be produced and tested in the field.
- The firmware for the HBA field split must be written.
- Additions in the LCU software for the HBA field split are required.
- One central clock should be implemented in the super station.
- HBA calibration should be in place.
- Definition of test suite to be run by the LCU.

OLAP:

- Should be made suitable to handle multiple independent RSP datastreams without correlating all of them (now OLAP correlates also the different RSP datastreams from the same station to support microstations).
- The network surrounding BG/L should be modified in order to split BG/L in four independent partitions. Will be done after the BG/L decision.
- Possibly optimizations in the IO nodes to cope with the 32 MHz bandwidth are necessary. Will be done after the BG/L decision.
- Making the storage section fault-tolerant and more efficient by using multiple compute cores.
- Tied-array beamforming definition will be done in Step 5 and implementation in Step 6.
- Performance tests of alternative BG/L solution.
- Snapshot imaging support.
- Multiple observations or one observation with multiple beams which change as a function of time.

SAS/MAC:

- Finishing Navigator 2.0 in Step 5.
- Making screens for the 20 station configuration
- Proof reaction times.
- Performance measurements triggers.
- Scheduler?

Decisions

ID	Date submitted	Decision
02	20061220	Every Step will start with a Kick-off meeting, in which the complete software team participates.
~~03~~	~~20061220~~	~~The project team starts immediately with the preparations of the next CDR in order to preserve progress of the CS1 realization~~
04	20070116	This meeting will take place every week on Tuesday 11:00. The existing software team meeting with all developers will stop to exist.
05	20070130	Step 1 will be changed to 16 subbands instead of 32 subbands.
06	20070130	Step 2 will contain a multiple node BBS. 6 µStations/Station will be postponed. Instead of this, 32 subbands measurements will be realized.
07	20070206	Step 1 will support 160 MHz observations. The other steps will support 200 MHz as

		well.
08	20070424	Step 2 will support 16 subbands @ 200MHz and 24 MHz at 160 MHz
09	20070424	During the rest of step two, OLAP will only support observations during the weekend.
10	20070522	The number of subbands per Measurement Set is set to 6 or 8 default.
11	20070522	Scheduler activities will be preferably activated in Q4 2007.
12	20070522	Procure, three Local Control Units to accommodate 12 microstations in CS010 in a quick way.
13	20070529	Integrate version numbers in all software.
14	20070529	Distinguish the software between a production version and an engineering version (partly now already the case).
15	20070605	All developed software under CVS will be transferred to Subversion. The main reason for this is that Subversion supports the integration of version numbers in the executables. In this way you can always retrieve which software is used for a certain build. First the impact of the transfer will be investigated by Marcel.
16	20070619	Marcel Loose will be the librarian of the LOFAR software. The available time for this will be shared with his BBS work.
17	20070710	The known pulsar survey mode will be the next mode to support (not in its full extent but partly on-line and off-line).
18	20070710	The temporarily off-line part of the known pulsar mode pipeline will not be under control of SAS/MAC. This will be put under control of SAS/MAC as soon as that software is available in the on-line part of the system.
19	20070814	Joe Masters makes the routine to read in the TBB data.
20	20071002	Fault tolerance of the system (mainly OLAP) is put at the top of the priority list after closing the SAS-MAC and CEP integration.
21	20071123	Kubuntu 7.10 desktop 64 bit OS is chosen for all machines except the BG/L and MAC/SAS machines
22	20071123	Station calibration work is smeared out over Step 4 and Step 5.
23	20071123	Global bandpass shape is moved to Step 5 because of its low priority.
24	20071211	Multiple beams per observation will be implemented instead of multiple observations (this is consistent with the plan).
25	20071211	Step 3 will be closed next Thursday. Any open items will be finished in Step 4.
26	20080130	Multiple beams are defined as multiple directions with the same set of antennas. Hence, only the angle, subbands and beamlets can be modified per beam.
27	20080206	Step 4 and Step 5 for MAC/SAS will be changed. The control of the offline pipeline will be postponed because the offline subsystems are not fixed yet. Currently the definition and design of the metadata flows will be set as goal for Step 4 and the implementation of the metadata flow will be the end goal of Step 5. Hence, after Step 5 (part of) the metadata is included in the Measurement Set.
28	20080213	Currently a single subband and single beam is stored in a Measurement Set. As soon as we are ready for mosaicing this probably should be changed in the future.
29	20080220	For storing the raw station beams the sanitizing operations like input buffer will be included in the online part. For this OLAP has to give operational support or instructions to the observers how to start up manually such observations. Since, this is an between solution this will not be automated via SAS/MAC.
30	20080227	Weekly build environment will be updated and automated.
31	20080227	After Step 5 the software documentation will be updated and obsolete packages will be removed.

Table round

- John: Is it desired to write the multiple beams in snapshot imaging to multiple MSs? This question will be asked again in the next meeting if Ronald and Michael are present.