# Minutes of Meeting LOFAR Software

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| **Date:** | 2009-04-01 |
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| **Next meeting:** | 2009-04-08 9:15-10:15 |
| | Multimedia room |
| **Present:** | |
| Andre Gunst | Yes |
| Ronald Nijboer | Yes |
| Ruud Overeem | Yes |
| John Romein | Yes |
| Michael Wise | Yes |

cc: Arnold Meijster, Rob van Nieuwpoort, Arthur Coolen, Jurjen Sluman, Pieter Donker, Chris Broekema, Martin Gels, Joris v. Zwieten, Marcel Loose, Adriaan Renting, Ger van Diepen, Max Avruch, 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, Sven Duscha, Jan-David Mol, Teun Grit, Alwin de Jong.

## *Remarks previous minutes*

- Supercomputing journal should be supercomputing conference in the OLAP section.

## *Announcements*

- CS302 link is connected to Groningen but does not work yet.
- HBA antenna installation started at CS302.
- Currently a station in Garching is build.

## *Action item overview*

| ID | Date submitted | Description | Owner | Planned date | Status |
|---|---|---|---|---|---|
| 83 | 20090325 | | | | |

Last: 82

## *Progress*

### Stations (André):

Achieved since last meeting:

- During or after the TBB busy week a bug has been found in the timestamps of the TBB output data. This will be fixed by Eric.

Problems / current activities:

- The HBA calibration waits for the first HBA field.
- The LBA calibration verification waits for the first LBA field.

Next actions:

- Continue with LOFAR20

## OLAP (John):

Achieved since last meeting:

- The TAB implementation is functional but not optimized.
- Alwin is testing the beamformer datawriter which catches the TCP stream.
- Martin shows today the feedback from correlator to MAC/SAS. Ruud will pick up today how to build the CEP stuff.
- Support any number of subbands to make the software more flexible is done by Rob. The question is if this causes the bug in the correlator mentioned in the "Problems" section.
- Discussion about UHEP mode: this mode needs an inversion of the polyphase filter bank operation after the tied-array beams have been formed. This should run a the BG/P. Furthermore, the polyphase filterbank needs to be bypassed and a second transpose is necessary for this. First a version should be made available which can run offline.
- Martin volunteered to transform the BG/L getstats script to a BG/P getstats script.

Problems / current activities:

- The most up to date correlator does not work properly. There are too much new features in it. Jan-David is digging into it.
- The way we do memory management in OLAP is hard to maintain. For simple applications it is sufficient. However for complex applications it is too complex. If this issue is causing bugs in the current software, than its priority to modify this will be set higher. The reason to use our own memory management is to prevent that the correlator is running out of memory after 48 hours of observation. All required memory is allocated in advance.
- John indicated that we have never correlated with a station which needs delay compensation of more than 1 sample. Dependent on the distance, CS302 would be the first.

Next actions:

- Continue with LOFAR20

## Offline pipeline (Ronald):

Achieved since last meeting:

- Global bandpass determination needs a new observation. This can be done only when the self generated RFI at CS010 is gone.
- The document written by Maaijke about the ionospheric approach is done.
- Joris made a Python implemention of the clock phase correction implementation.
- In the standard imaging pipeline Mysql is used to keep progress, while a transfer to Postgres is ongoing to be compatible with the rest of the system.

Problems / current activities:

- Polarisation imaging is done by Maxime (this starts in April).
- Evert Rol will work on the regression test suite for the imager.
- Ronald is busy with a document about beam modeling.
- It is unsure if the CASA core writer can handle the 48 MHz bandwidth. This needs probably improvement in the CASA core.
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Next actions:

- Continue with LOFAR20

## SAS + MAC + SHM (Ruud):

Achieved since last meeting:

- Pieter has been working on updating the TBB driver.
- Arthur and Ruud set up the data structures for CEP in PVSS.
- Possibilities of using the SAS/MAC system are discussed with the operators and they will use it now.
- Most of the coding is done for the ring splitter. Currently Ruud is working on the last part. Then also the MAC controller is able to use it.

Problems / current activities:

- Both the BF data writer and TBB data writer are not ready for integration into MAC/SAS in this Step.
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Next actions:

- Continue with LOFAR20

## User Software (Michael):

Achieved since last meeting:

- A lot of people were last week busy with the TBB busy week. They found bugs in the dataframes and data writer. They fixed also a number of bugs, amongst them the time ordering issues (dropped frames, duplicated frames, etc.). The datawriter program is probably too slow to read the datastream. This should be optimized in the datawriter. The TBB boards can send data at a maximal rate of 1 Gbps each. UDP-copy can keep up with this rate (however that program does no intellectual things to the data like re-ordering).
- Processing multiple MS in parallel excluding BBS (yet) is almost finished.
- There is a first version of the mosaicing script including a manual and a first test script.
- Michael started with the data product inventory.
- GSM database implementation is finished but there will be upgrades.

- RM synthesis tool is an issue, since more complex algorithms are added while the simple one is not available yet.
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Problems / current activities:

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Next actions:

- Continue with LOFAR20

## *Software integration*

Achieved since last meeting:

- Marcel needs still at least a month to finish the integration with Cmake.

Problems / current activities:

- Compile a list of anticipated data products and calibration or metadata files associated with each of the pipelines. It is a task on the task list.

Next actions:

- 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.
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## *Decisions*

| ID | Date submitted | Decision |
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| 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. |

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| 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. |
| 32 | 20080423 | Basically two Low Band modes will be supported initially: a LBL and LBH mode. The connection between antennas and RCUs have to be chosen such that those to modes make sense. |
| 33 | 20080528 | The position of all individual dipoles will be made available centrally in the database. |
| 34 | 20080603 | The data format of the positions will be delivered in ETRS coordinates by the roll out team. However, the data format of the positions will be stored in ITRF format in the LOFAR databases. Hence, all software and configuration files dealing with coordinates must be made compatible with the ITRF dataformat. Hans van de Marel is responsible to convert the ETRS coordinates to ITRF coordinates for the LOFAR system. |
| 35 | 20080903 | Kubuntu will be installed on LOFAR18, which will serve as a software development machine. |

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| 36 | 20081022 | Station cabinet will be heated (if necessary) to 10 degrees Celsius (for the LCU). |
| 37 | 20081029 | We will transfer the build environment to cmake. |
| 38 | 20081029 | Step 1 will be closed at 11 November. |
| 39 | 20081112 | Bugs found in the field have the highest priority to solve. Bugs which take more than a week to solve will be added to the task list and prioritized in the software meeting. During bug solving tests should be written up, which proves the correct behavior. These tests will result in a procedure to check the functionality when new soft/firm ware is loaded. |
| 40 | 20081126 | The 4 bit mode will be supported after MS^3. |
| 41 | 20081203 | We will modify the build environment to cmake from now on. |
| 42 | 20090129 | Transient source modeling tool under Python will be used for source modeling. |
| 43 | 20090129 | Delay deadline of Step 2 to 26 February 2009. |
| 44 | 20090209 | Remote Stations including the ring splitter near the core will be renamed to CS stations. |

Last: 44

## *Table round*

- Ruud is off in May for 5 weeks
- André is off in June for 4 weeks
- Michael: About the wish of the TBB people to make manual dumps of TBB via MAC/SAS via buttons. What they really want is to generate a trigger and than MAC reacts on this. This is also in line with the requirement that we should be able to handle external triggers. After MAC receives such an external trigger, a decision algorithm in MAC can decide what to do with it. For example it can cause a freeze of the TBBs. This feature will be planned for the next steps.