Corrélateur WIDAR Correlator

Software Overview

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Expanded Very Large Array

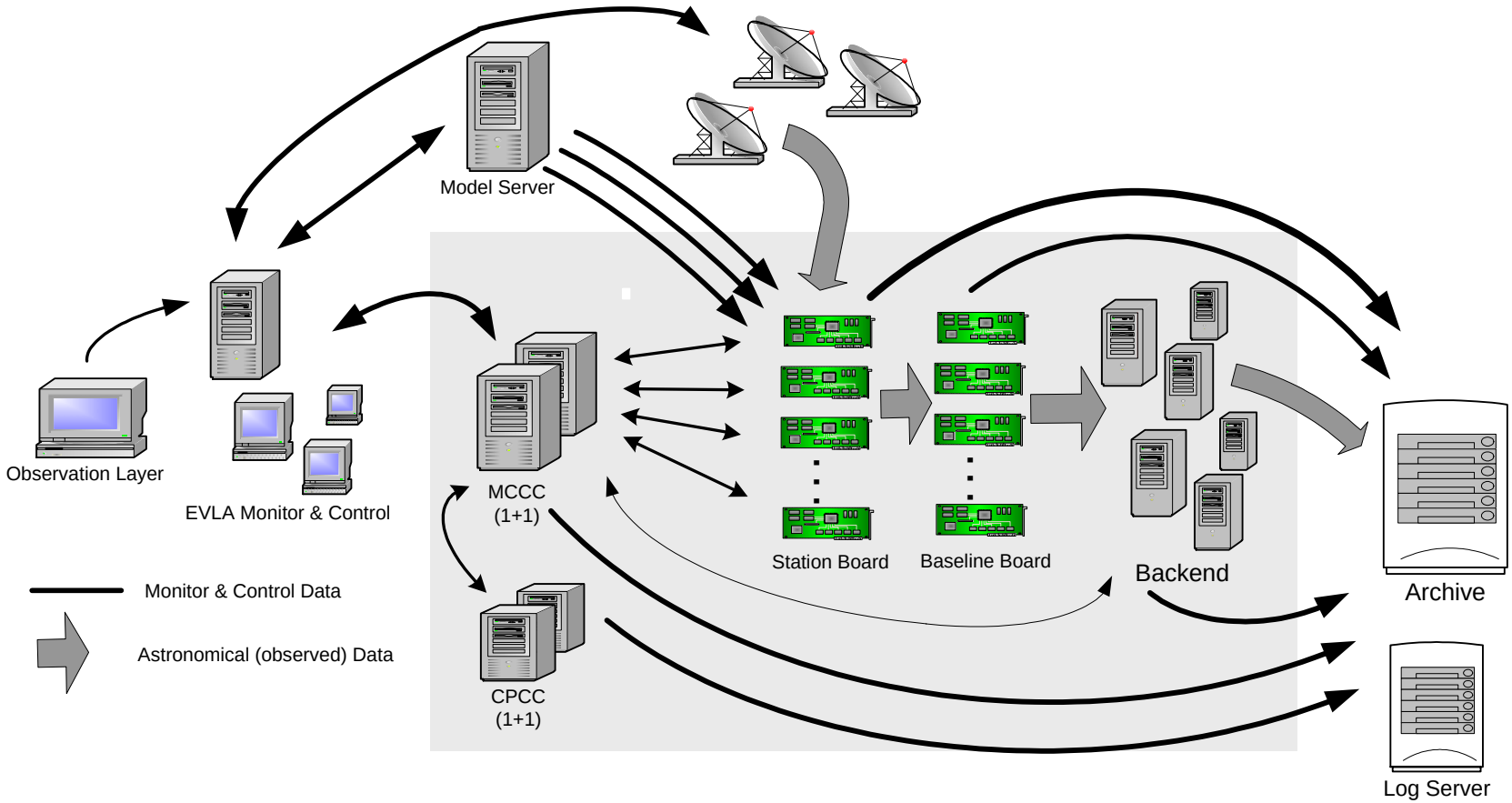
Outline

- Overview of the software architecture.
  - This presentation provides only a brief overview of the WIDAR correlator software architecture.
  - Software architecture has already been presented more than once.
  - The architecture document is available on the WIDAR web page:

  http://www.drao-ofr.hia-iha.nrc-cnrc.gc.ca/science/widar/private/Software.html

- Status

EVLA Correlator



Software Sub-systems

- Master Correlator Control Computer (MCCC) is a single point of access for the control and monitoring; it implements Virtual Correlator Interface (VCI), maintains overall system status and coordinates operation of the correlator subsystems.

- Correlator Power Control Computer (CPCC) monitors and controls the power supplies and cooling fans in the correlator racks.

- Correlator Monitor Interface Board (CMIB) software configures, controls and monitors the hardware.

- Backend software is on the data path, it performs FFT and formatting of the the correlator output data.

Communication

- MCCC serves as an interface between the EVLA Monitor & Control System (Executor) and the correlator components.

- CMIBs, Backend and CPCC:
  - Communicate with the EVLA M&C System (Executor) via MCCC,
  - Do not communicate with each other,
  - Send output data, meta-data, configuration, etc. directly to archive,
  - Send alarms and logs to Log Server.

- Backend consists of a number of nodes and a single Backend Monitor & Control System. MCCC communicates only with the Backend M&C System and not with other nodes.

- XML messages are used for communication both among the Correlator sub-systems and over the VCI.

Architecture I

- The correlator software is distributed over a number of processors that communicate over the network.
- Each sub-system may become active independently and advertises its presence in the network.
- Communication between MCCC and other correlator sub-systems is via asynchronous XML messaging.
- In order to start processing observed astronomical data, Station Boards, Baseline Boards and Backend must first receive configuration, i.e. communication needs to be established between:
    - MCCC and EVLA M&C (Executor),
    - CMIBs and MCCC,
    - Backend M&C and MCCC.

Data Flow

- The flow of astronomical data is isolated from the monitor and control data.
  - Exceptions : Wideband Correlator and Radar Mode.

- The correlator software processes mostly Monitor & Control data.
  - The following components process astronomical data:
    - Backend,
    - Wideband Correlator – product integration performed by Station Board software and
    - Radar Mode – Station Board Software reads output data from h/w and transmits it to archive.

Architecture II

- All computer systems are COTS products running LINUX.
- Software is developed in Java (MCCC) and C (CMIBs and Backend).
- 1+1 redundancy will be provided for critical sub-systems: MCCC, CPCC and Backend M&C.
- The EVLA Software Architecture is described in the document:
  "The EVLA Correlator Software Architecture", DRAO ASN25200.

Status

- ✓ Requirements for the correlator software have been defined.
- ✓ Software architecture has been defined.
- ✓ Virtual Correlator Interface :
  - ✓ Content of the correlator input and output has been defined
  - ✓ Format for the archived configuration and meta-data has been defined.
  - – Format for backend and radar mode output data still needs to be defined and will be discussed at this meeting.
- ✓ Requirements and Functional Specification (RFS) documents have been developed for the major components:
    - ✓ Generic CMIB software
    - ✓ Backend and
    - ✓ MCCC
- • Rules for the mapping of the observation configuration into hardware configuration have been defined and are partially implemented (development effort postponed due to work on the software for the testing of the board prototypes).

Software for the testing of the board prototypes I

- ✓ Software requirements are defined in the document DRAO A25204N001.
- ✓ Software development is well under way and we expect that we will be ready for the testing in May 2006.
  - ✓ CMIB communication infrastructure (IP and HTTP) has been defined and is already running on the PC104 board in the lab.
  - ➢ Low-level CMIB software: device drivers and module access handlers (MAHs) for Baseline Board and Station Board are being developed.
  - ➢ Backend:
    - ✓ Rudimentary (prototype) implementation of the Backend software is available.
    - ✓ Basic Monitor & Control interface (Command Line Interface) is provided.
    - ✓ User Manual that describes the current implementation is available.
    - – Some work will be required on output data formatting.
    - – Additional work is required to obtain the required products (TBD).

Software for the testing of the board prototypes (II)

- GUI Interfaces for the Baseline Board and Station Board are in the final phase of development.
- GUI interface for the graphical representation of the correlator output:
  - The first version of RFS has been released,
  - s/w development has started.
- System-level interface for the prototype testing is being defined, implementation will start in May 2006.
- So far, Monitor & Control function for the following subsystems is not integrated:
  - Station Board Fiber Optic Receiver Module (FORM)
  - Backend
  - Model Server (not part of the correlator, will be needed for on-the-sky testing)

The End