Backend System Requirements

System Requirements Specification

EVLA Correlator Backend

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Revision 2.0

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Assumptions

- Correlator Handles Packetization of Lag Frames
- Lag Frames Will Not Necessarily Arrive in Lag Set Order
- Lag Frame Delivery a One-Time Shot
- Lag Set Length Always Power of 2
- Timely Delivery of Indirect Data
- e2e Capable of Handling Output Rates and Volumes

Constraints

- Critical Component in the Astronomical Data Path
- Operations Performed Shall be Reversible
- Performance Limits Set by Technology and Budget

Input Data

- Lag Frames
- State Counts
- Data Valids
- Meta-data
- Observational Mode
- Data Processing Parameters
- Status Requests

Output Data

- Formatted Observational Output
- Status Reports
- Error Reports
- Warning Reports
- Failure Reports
- Recovery Reports

Correlator Interface

- Receive Lag Frame Data Packets
- All Backend Processors Have Paths to All Correlator Outputs
- Sufficient Bandwidth to Meet Performance Requirement
- All Frames For Same Baseline Routed to Same BE Processor

Monitor & Control Interface

- Receive Non-Lag Frame Data
- Receive Status and Queries
- Send Query Responses and Internally Generated Messages

End-to-End Interface

- Transfer Formatted Data
- All Backend Processors Have a Path to the e2e System
- Sufficient Bandwidth to Meet Performance Requirement

Data Processing

- Lag Set Assembly
- Normalization
- Coarse Quantization Correction
- Time Stamp Adjustment
- Interference Removal/Reduction
- Windowing
- Fourier Transform
- Integration
- Output Formatting

Internal Monitor and Control

- No User Interface of Its Own
- Respond to Outside Queries
- Selectable Internal Test Modes
- Self Monitoring
- Self Recovery
- Problem Reporting

Performance

- Maximum Aggregate Input Rate of 1.6 Gbytes/sec
- Maximum Aggregate Output Rate of 25 Mbytes/sec

Reliability

- Detect and Recover From Processor Failures
- Detect and Recover From Process Failures
- Detect and Recover From Internal Network Failures
- No Total System Reboots Between Maintenance Windows (Goal)

Scalability

- Total System Extensible to Higher Rates of Input, Output, and Data Processing
- Hardware Extensible in a Manner That is Transparent to Software and Vice Versa
- Upgrades Meet Seamlessly With Unchanged Components