

The Aragats Data Acquisition System for Highly Distributed Particle Detecting Networks

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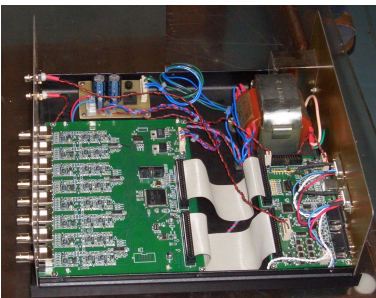
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- Simple and Reliable Hardware
- Single Click Installation & Easy Maintenance
- High Performance Readout with Accurate Timings
- Distributed Architecture based on Web Services
- Extensible Data Format based on XML
- AJAX Based Control Interface



Hardware

Smart DAQ (Developed by Electronics Group of CRD)



- Photo-multipliers with Programmable High Voltage sources
- Logarithmic ADC modules
- Philips LPC 32-bit micro-controller for the data preprocessing
 - Flexible Coincidence/Anti-coincidence Configuration
 - Events & Coincidences Counting
 - Variations, Correlations and Spectra Support
 - Independent Incidences Reporting
- RS232, RS485, USB, Ethernet Interfaces

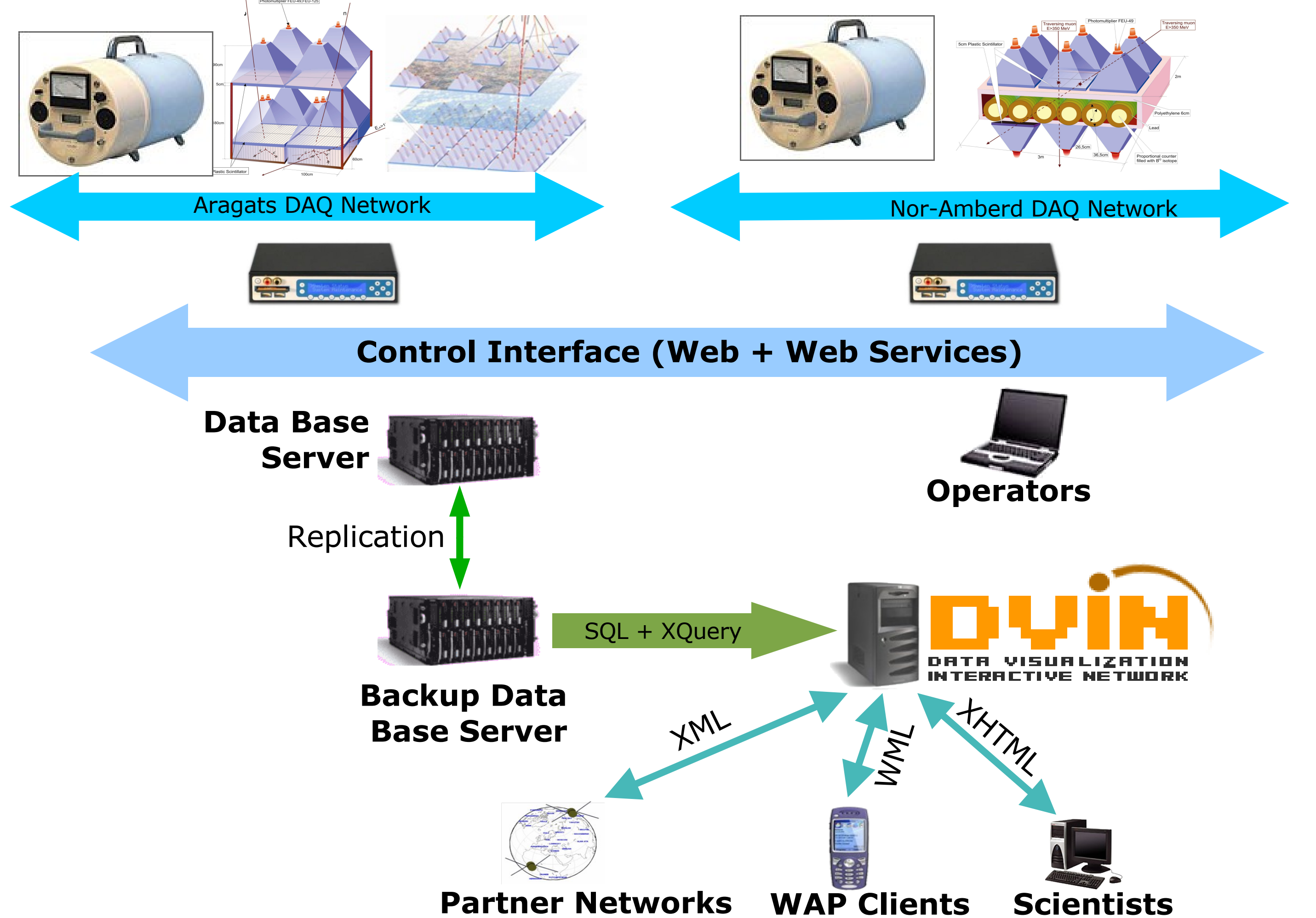
VIA Eden

Minibox M100 /C3 533MHZ



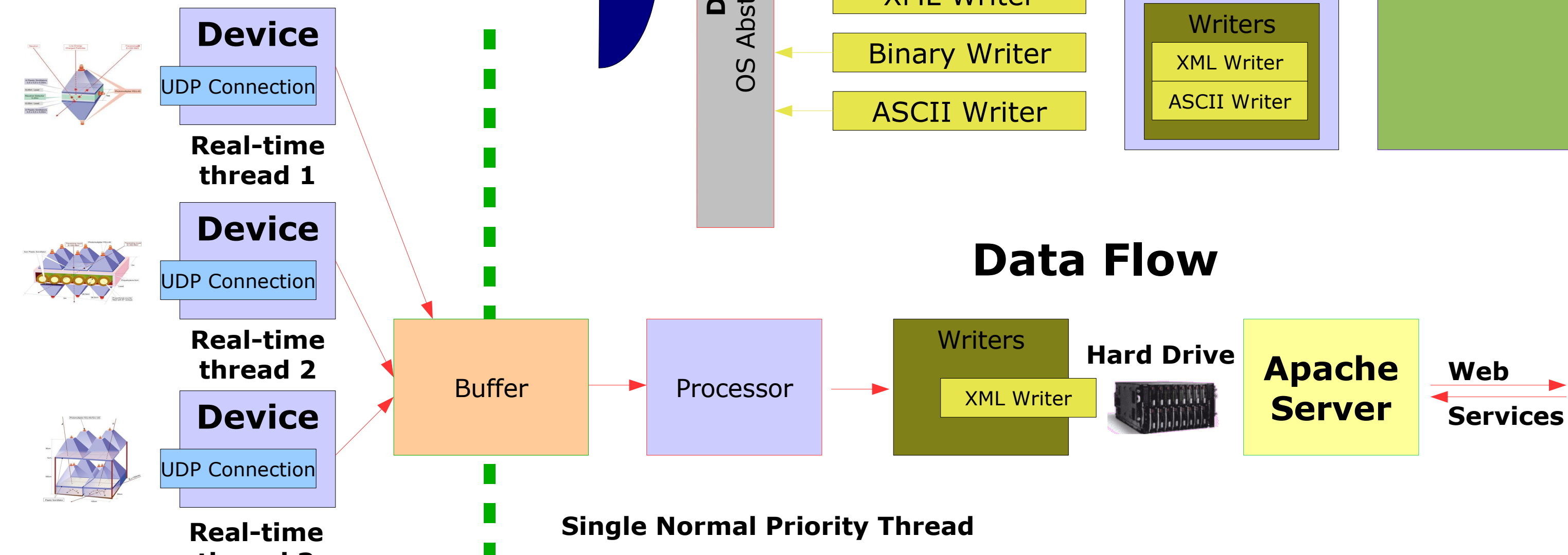
- Fan-less and Disk-less Design
 - High Reliability
 - Reduced power consumption
- Embedded Linux on CF Cards
 - Easy Maintenance
 - Easy Upgrades
 - Real-time capabilities
- LCD Screen with Keypad
 - Error Reporting
 - Basic Data Monitoring
 - Basic System Control

Abstract: For the reliable and timely forecasts of dangerous conditions of Space Weather world-wide networks of particle detectors are located at different latitudes, longitudes and altitudes. To provide better integration of these networks the DAS (Data Acquisition System) is facing a challenge to establish reliable data exchange between multiple network nodes which are often located in hardly accessible locations and operated by the small research groups. In this article we present DAS for SEVAN (Space Environmental Viewing and Analysis Network) elaborated on the top of free open-source technologies. The SEVAN detectors are located on the altitudes 2000 and 3200 meters above the sea level and performing continuous monitoring of various species of secondary cosmic rays. Next step of SEVAN network expansion will be installation of detectors in Croatia, India and Indonesia.



Software

- Single architecture for all hardware
- Support for multiple attached devices
- Flexible configuration through abstraction layers
- High performance threading model
- Web-Service based data distribution



Control Interface

- System Control and Monitoring
 - Start - Stop - Load/Set Configuration
 - USB Device Auto-configuration
 - Time Synchronization
 - System Status Monitoring
 - Error Reporting
- Data Access and Visualisation
 - High Frequency Debugging Data
 - Annotated Most Recent Data
 - Access to Complete Data Files
 - Time Series Plots, Spectra Plots
 - Highlighting Problems on the Plots
- Control of Attached Electronics
 - Coincidences Configuration
 - Setting PMT Parameters
 - Pass through Commands to Electronics

Main Screen

Global Information

Server: Aragats Data Acquisition Server
Server Name: adas_int
Version: 3.1.0
Status: OK
Server Time: 2006-11-29T06:38:13.9060580+04:00
Subnetwork: 192.168.203.124 (Detected connected devices)
Data Storage: 30 days (Set, Clear)
Disk Space: Root FS - 2435MB, FTP FS - 54MB, Log FS - 19MB

Last Error: Everything is fine. No errors detected!

DarkSoft News: Everything is fine. No errors detected!

DarkSoft Projects: Everything is fine. No errors detected!

Restart Server: Stop Server, Overwrite Config, Update Config, Configure USB, NTP Status, Shutdown PC

NAMT Device: snt
Version: 3
Status: Running
Properties: SubDevices: 140
Hardware: SNT, Version: 4
Configuration: View current configuration, Adjust HV/Thresholds, Adjust Layout
Operation: Monitor, Send Control Command, Real Time Data

Last Obtained Data

Data obtained at: 2006-11-27T14:56:00.000000+04:00
Calculation Duration: P60.00000000
Quality: 100.00

1	Intensity of the Neutron Flux	23
2	Intensity of the Muon Flux	67233
3	Intensity of the Charged Particles Flux	556
4	Coincidence [1-2-3]	2
5	Coincidence [1-2]	4
6	Coincidence [2-3]	315
7	Coincidence [1-3]	4
8	Variance of ID:1	1.0836
9	Variance of ID:2	2012.1916
10	Variance of ID:3	8.9273
11	Correlation between ID:1 and ID:2	-0.4123
12	Correlation between ID:1 and ID:3	-0.0963
13	Correlation between ID:2 and ID:3	-0.4475

Coincidence Configuration

Sensors: 3

Configured Coincidences

Coincidence 1-2-3. Coincidence of 1-2-3
Type: all, Spectrums: true, Rules: 0, Success: 1 2 3

Coincidence 1-2. Coincidence of 1-2
Type: all, Spectrums: true, Rules: 0, Success: 1 2

Coincidence 2-3. Coincidence of 2-3
Type: all, Spectrums: true, Rules: 0, Success: 2 3

Coincidence 1-3. 1-3
Type: all, Spectrums: true, Rules: 0, Success: 1 3

High Voltage Source Control

Channel 1 (Layer: 1, Sensor: 1)

High Voltage (V): 200
Threshold (V): 2.2300
SoftThreshold: 1

High Voltage: 1401
Cur. Counter: 713

Monitoring

Channel 1 (Layer: 1, Sensor: 1)

Revised: 03:56:07 High Voltage: 1401
Counter: 41514 Threshold: 2.2300

Channel 5 (Layer: 2, Sensor: 1)

Revised: 03:56:07 High Voltage: 1349
Counter: 24455 Threshold: 2.1500

Data Format

- Complete Detector Prototyping within Experimental Conditions
- Extensible XML Metadata describing the data physical meaning
 - Type of Data, Incident directions, Units of Measurement, Threshold Energies, etc.
- Full Compatibility with Legacy Software
- Moderate Dataset Size
- Fast Data Extraction Mode

ADAS Data

XML Data Layout

- Contact Information
- Various Related Information
- Detector Description
- Detector Geometry
- Physical meaning of Columns

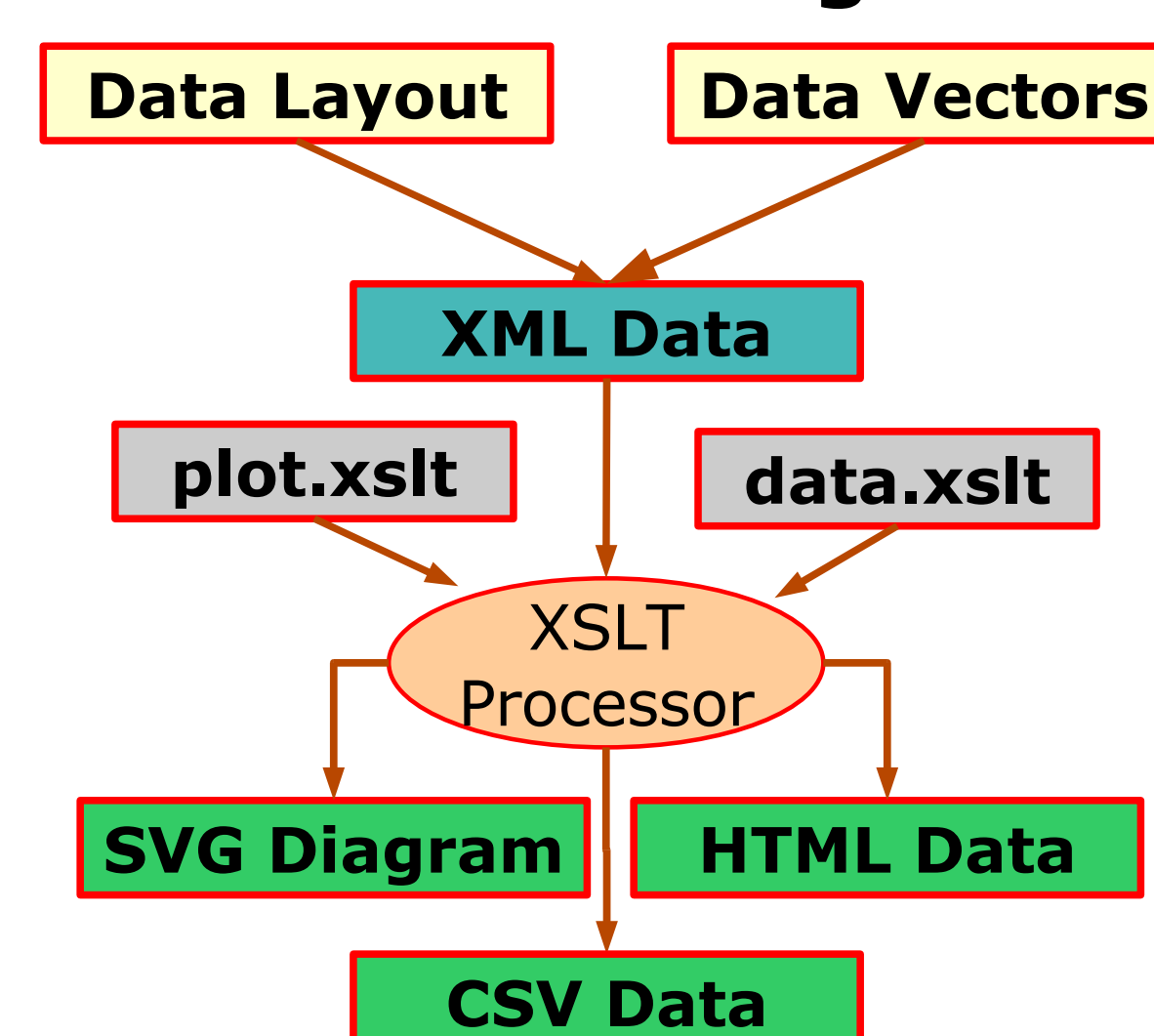
SQL Data Vectors

- Used Layout
- Time / Quality / Duration
- Detector Dependent Information
- Data Vector

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6572 1830 472 239 580
6570 1834 469 241 581
<Detector type="neutron" emin="120">1</Detector>
<Detector type="neutron" emin="190">2</Detector>
<Detector type="muon" emin="290">3</Detector>
<Detector type="neutron" emin="490">4</Detector>
<Detector type="muon">5</Detector>
    
```

Full Processing Mode



Fast Processing Mode

