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Advanced Data Acquisition System for SEVAN

Features, Architecture and Data Format

ADAS Features

- Collection of Data
 - Particle Counters
 - Variance & Correlations of Particle Counters
 - Coincidence / Anti-Coincidence Counters
 - Sensor Spectra (Including Conditional)
 - Individual Events (10ms precision / 10us relative precision)
- Detector Control
 - Electronics (High Voltages, Thresholds, ...)
 - Layout Configuration (Coincidences, Spectra)
 - Software Configuration
- Data Dissemination using Web Services
- Configuration/Control/Monitoring using Web Interface

Control Web Interface

Version: 3.1.0
Status: Ok

- Server Info
- Documentation
- Configuration
- Error Log
- Real Time Data
- Current Data
- Today Data
- Stored Data

- DarkSoft News
- DarkSoft Projects

- Restart Server
- Stop Server
- Download Config
- Upload Config
- Configure USB
- NTP Status

Shutdown PC

Global Information

Server : Aragats Data Acquisition Server
Server Name : adas_snt
Version : 3.1.0
Status : Ok
Server Time : 2006-11-29T06:38:13.9060580+04:00
Subnetwork : 192.168.203.1/24 ([Detect connected devices](#))
Data Storage : 30 days ([Set](#), [Clean](#))
Disk Space : Root FS ~ 2435MB, FTP FS ~ 54MB, Log FS ~ 19MB

Last Error

Everything is fine. No errors detected!

NAMT Device: snt

Version : 3

Status : Running

Properties : SubDevices: 1(4)

Hardware : SNT, Version: 4

Configuration: [View current configuration](#), [Adjust HV/Thresholds](#), [Adjust Layout](#)

Operation : [Monitor](#), [Send Control Command](#), [Real Time Data](#)

Reset

snt **Description**: [View](#), [Download](#), [Upload](#)

Sub Data: control, events, opinfo, spectrum1, spectrum2, spectrum3, spectrum4, spectrum5, spectrum6, spectrum7, spectrum8

Dates: 20061111, 20061112, 20061113, 20061114, 20061115, 20061116, 20061117, 20061118, 20061119, 20061120,

Detailed Data View

SA Device: analyzer ([Update](#))

Warning: Last data is written 40 hours ago

SubData: [control](#), [opinfo](#), [spectrum1](#), [spectrum2](#), [spectrum3](#), [spectrum4](#), [spectrum5](#), [spectrum6](#), [spectrum7](#), [spectrum8](#)

Data obtained at: 2006-11-27T14:56:00.0000000+04:00

Calculation Duration: P60.0000000

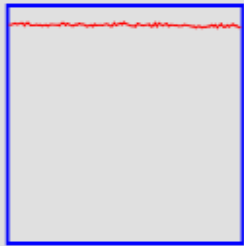
Quality: 100.00

| | | |
|----|---|-----------|
| 1 | Intensity of the Neutron Flux Sensor: 1 | 23 |
| 2 | Intensity of the Muon Flux Sensor: 2 | 67233 |
| 3 | Intensity of the Charged Particles Flux Sensor: 3 | 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 targetid: 1 | 1.0836 |
| 9 | Variance of ID:2 targetid: 2 | 2012.1916 |
| 10 | Variance of ID:3 targetid: 3 | 8.9273 |
| 11 | Correlation between ID:1 and ID:2 targetid1: 1, targetid2: 2 | -0.4123 |
| 12 | Correlation between ID:1 and ID:3 targetid1: 1, targetid2: 3 | -0.0063 |
| 13 | Correlation between ID:2 and ID:3 targetid1: 2, targetid2: 3 | -0.4475 |

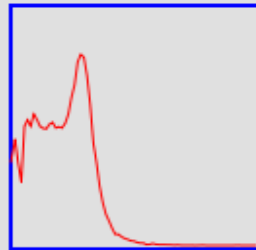
Monitoring

Channel 1 (Layer: 1, Sensor: 1)

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



Counter



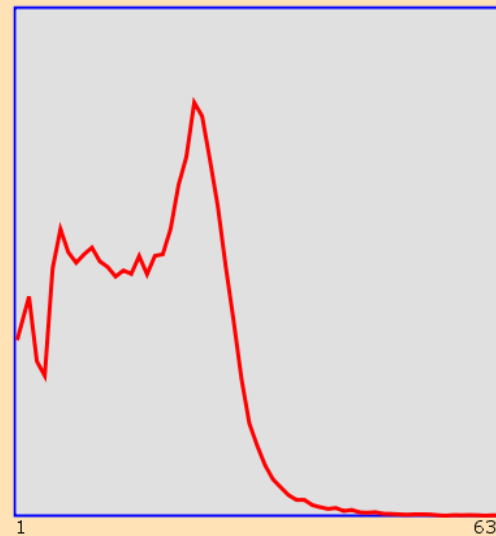
Spectrum

Channel 5 (Layer: 2, Sensor: 1)

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



Detector 1 Spectrum

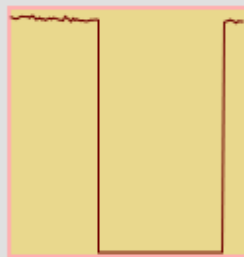


Center: 23

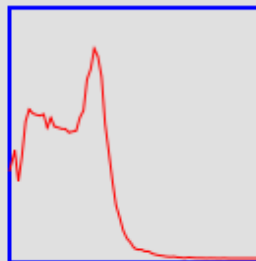
Total Events: 41364
Events (>20): 16355
Events (>26): 5081
Events (>28): 2769
Events (>34): 614

Channel 2 (Layer: 1, Sensor: 2)

Revised: 01:54:30 High Voltage: 1580
Counter: 43808 Threshold: 2.3000



Counter



Spectrum

Counter

Spectrum

Detector Control

Channel 1 (Layer: 1, Sensor: 1)

High Voltage (V):

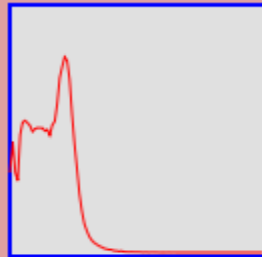
1500

Threshold (V):

2.2300

SoftThreshold :

1



High Voltage: 1398

Cur. Counter: 671

Channel 1 (Layer: 1, Sensor: 1)

High Voltage (V):

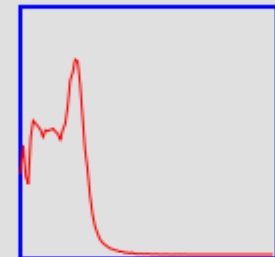
200

Threshold (V):

2.2300

SoftThreshold :

1



High Voltage: 1401

Cur. Counter: 713

Channel 2 (Layer: 1, Sensor: 2)

High Voltage (V):

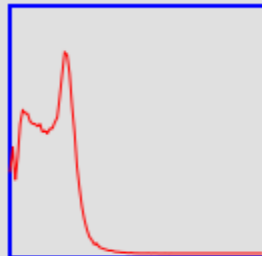
1580

Threshold (V):

2.3000

SoftThreshold :

1



High Voltage: 1579

Cur. Counter: 709

Channel 2 (Layer: 1, Sensor: 2)

High Voltage (V):

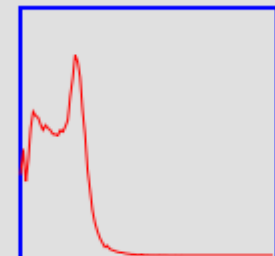
1580

Threshold (V):

2.3000

SoftThreshold :

1



High Voltage: 1579

Cur. Counter: 718

Coincidences/Spectra Configuration

Sensors: 3

Add Coincidence

Name:

Type:

- Custom
- None Of Sensors
- One Of Sensors
- Some Of Sensors
- All Of Sensors
- Sensor States
- Conjunction of Coincidences
- Disjunction Coincidences

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

Custom Rules

Adjust "newrule" Configuration

Type: Custom

Description: newrule

Collect Events
 Interim

Success Condition
N. of Successful Rules:
Above
3

Add New Rule
Type: Coincidence
Item: Coincidence of 1-2
Test: Above Threshold
Threshold: 1

Add New Spectrum
Sensor 3

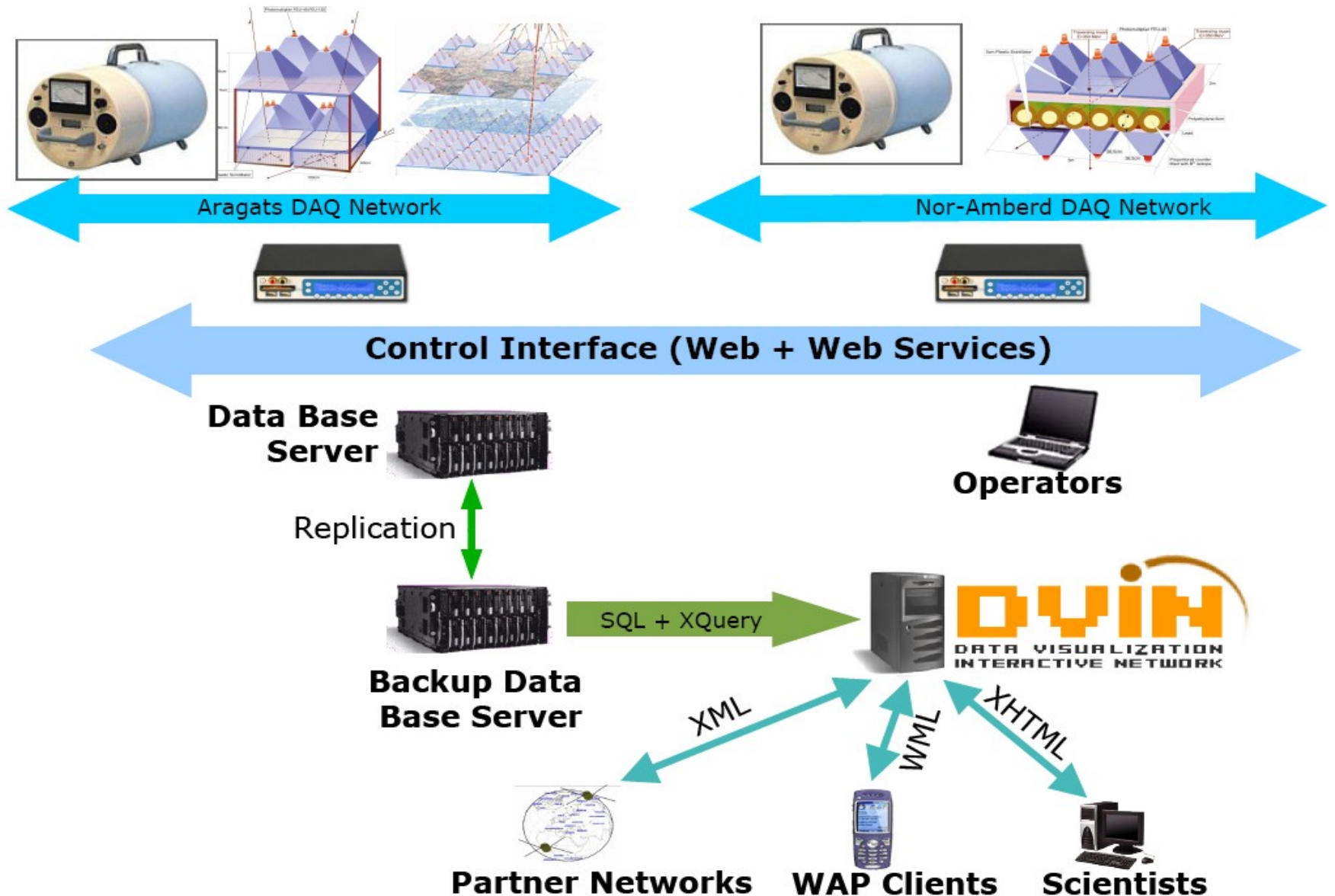
Configured Rules

| Target | Test | Delete |
|-------------------|-----------|---------------------------------------|
| sensor 1 | above 5 | <input type="button" value="Delete"/> |
| sensor 2 | below 100 | <input type="button" value="Delete"/> |
| sensor 3 | false | <input type="button" value="Delete"/> |
| coincidence 1-2-3 | true | <input type="button" value="Delete"/> |
| coincidence 1-2 | above 1 | <input type="button" value="Delete"/> |

Configured Spectrums

| Sensor | Delete |
|----------|---------------------------------------|
| Sensor 2 | <input type="button" value="Delete"/> |
| Sensor 3 | <input type="button" value="Delete"/> |

ADAS Architecture



Control PC

VIA Eden Platform

Minibox M100 /C3 533MHZ, 512MB RAM/



- ◆ Improved stability due to fan-less and disk-less design
- ◆ Reduced power consumption
- ◆ Embedded Linux running from Compact Flash Memory Card
 - ◆ Easy Maintenance
 - ◆ Real-time capabilities
- ◆ Small Size
 - ◆ Allows integration with readout electronics
- ◆ LCD Screen with Keypad
 - ◆ Error Reporting
 - ◆ Basic Data Monitoring

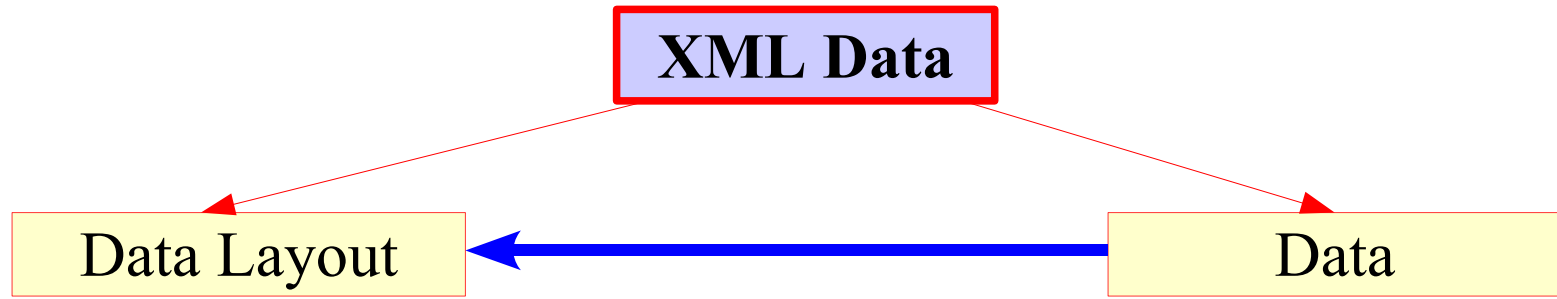
Old ASCII Data Format

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| 10:29:00 | 54 | 51 | 48 | 52 | 57 | 54 | 45 |
| 10:30:00 | 56 | 54 | 46 | 51 | 44 | 52 | 47 |
| 10:31:00 | 60 | 48 | 43 | 39 | 50 | 54 | 50 |
| 10:32:00 | 44 | 42 | 53 | 53 | 47 | 55 | 50 |
| 10:33:00 | 48 | 54 | 50 | 53 | 46 | 55 | 40 |
| 10:34:00 | 50 | 56 | 50 | 43 | 55 | 47 | 64 |

Meaning of the data?

- Channel Type
- Particles registered
- Min/Max Energies
- Direction
- Engineering Units
- Precision
- Duration
- Algorithms used
- Alert Conditions

New Format: Data and Layout

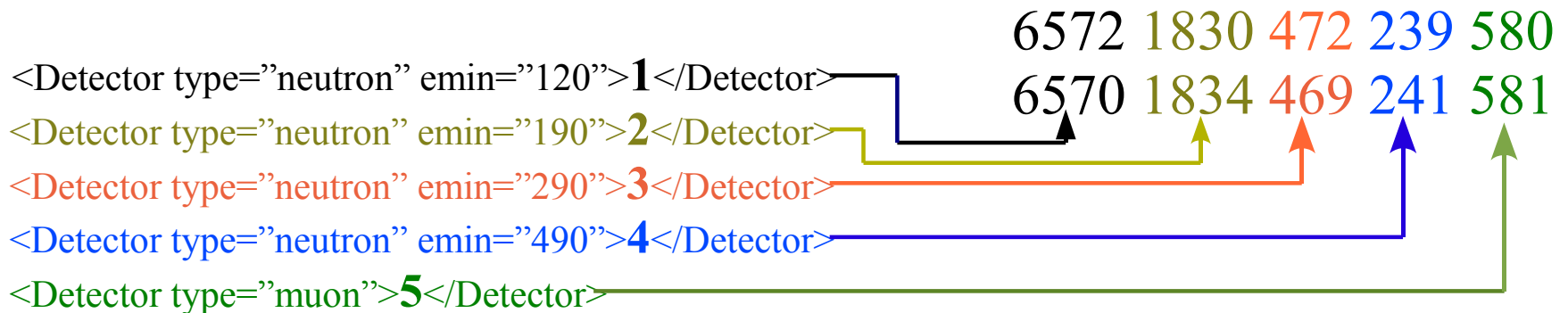


XML File / XML Database

- Installation Description
- Installation Geometry
- Data Layout

ASCII File / SQL Database

- Used Layout
- Time / Quality / Duration
- ASCII Data



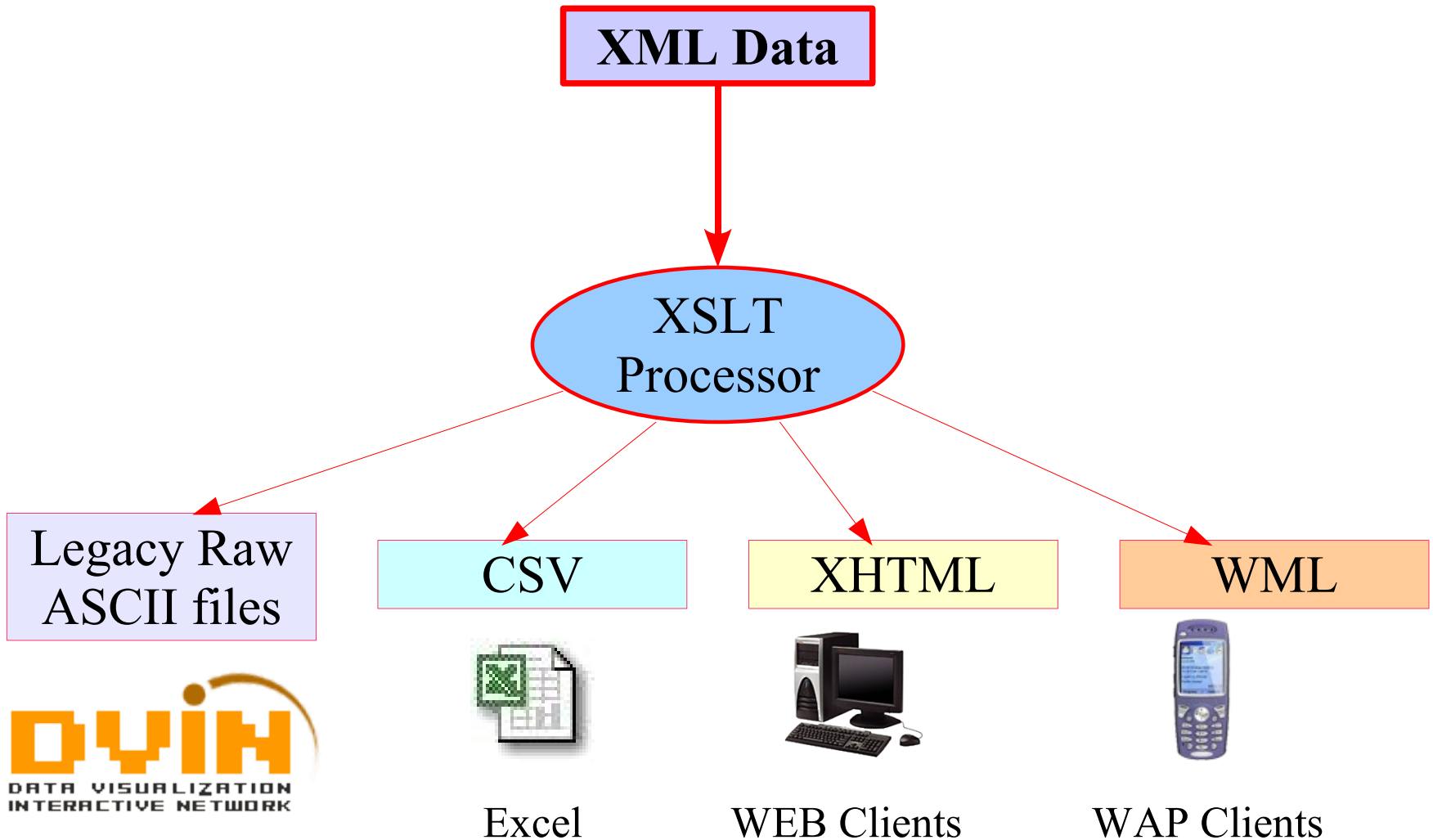
XML: Advantages/Disadvantages

- Good for Heterogeneous Environments
- Readable
- + → Extensible
- High Level Standard
- XSLT Filter Support

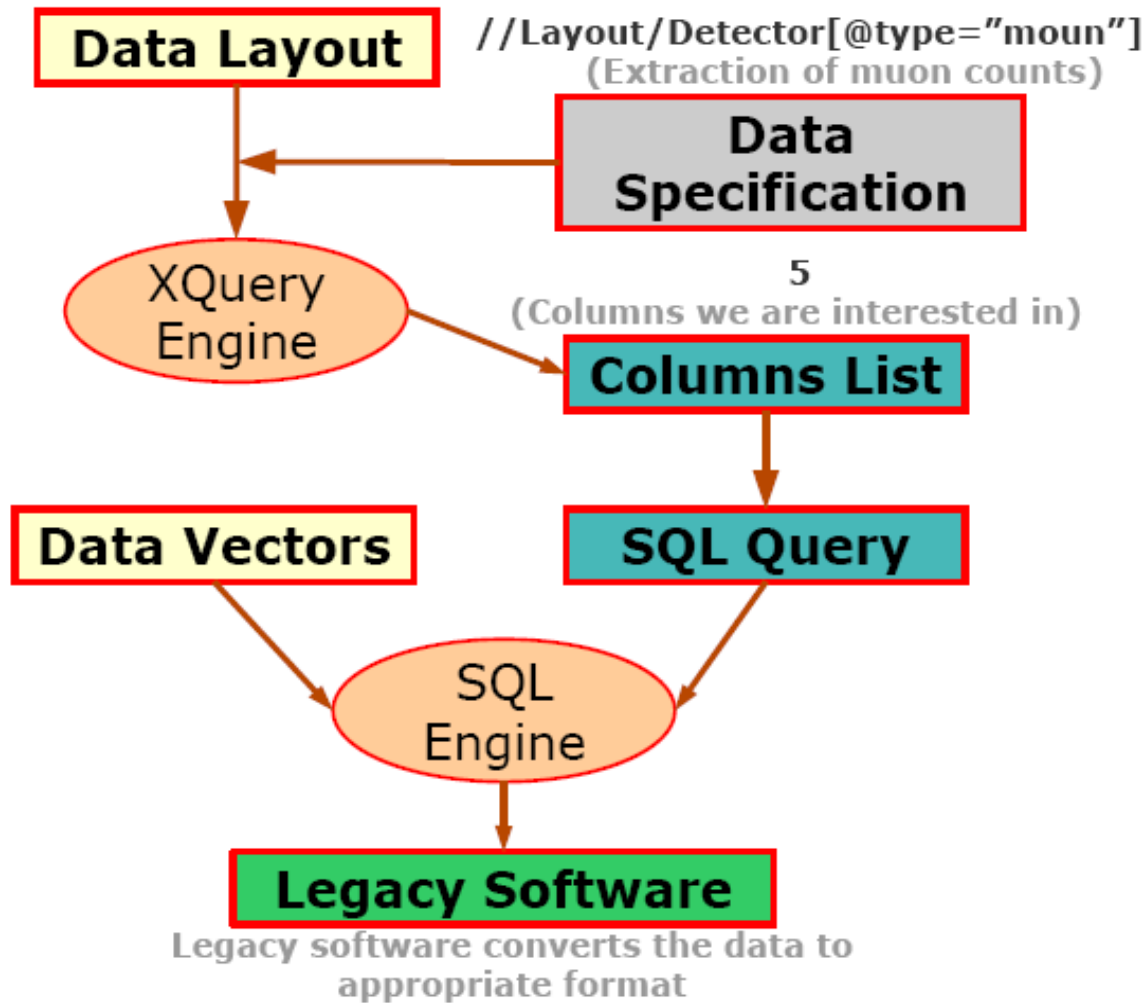
```
<Data>  
  <Time>12.01.2005</Time>  
  <Value>64</Value>  
  <Units>MEV</Units>  
</Data>
```

- Extremely Large Data Size
- XML Processing is Required to Extract Data
- Incompatibility with current software
- XML Databases are terribly slow

XSLT Filters



Fast Data Access



Conclusion: Standardization

- Standard Transport Protocol: Ethernet
- Standard Data Acquisition Modules: VIA Eden
- Standard Data Acquisition Software
- Standard Data Exchange Interface
- Self Describing Data Format
- Web Based Control/Monitoring Interface