Logging and DAQ

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Outline

What we learnt at String 1

How we built on this experience
- Approach
- Solutions
- Value added
- Problems encountered

Where we go from here: lessons for LHC controls

History: String 1

String 2: we did not start from scratch

FACTS
- Good DAQ & SCADA
- Web-based data extraction interface

PROBLEMS
- No instrumentation database
- Ad-hoc run configuration
- Data analysis slow and tedious
- People developing own tools

String 2 approach

Identify experiment phases

Inventory
- What we have
- What is missing

Propose solutions to fill the holes

The phases

Instrumentation

Configuration

Storage

Extraction

Software tools

strict
STRING2 INSTRUMENTATION AND CONFIGURATION TOOL

Instrumentation

Configuration

stride
STRING2 DATA EXTRACTOR

Storage

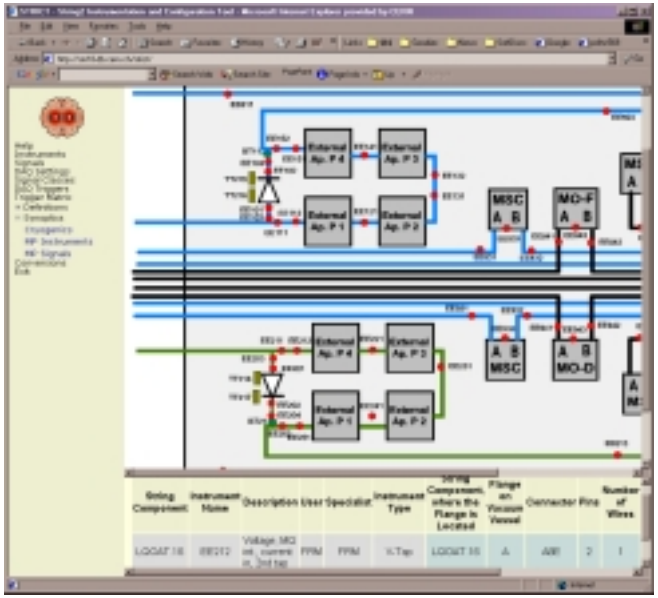
Extraction

strict

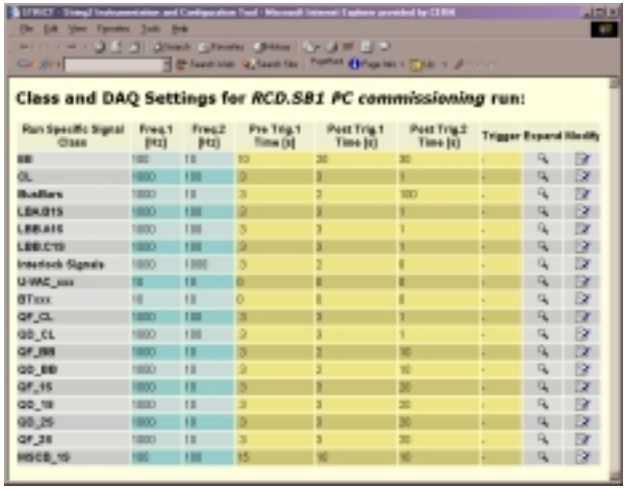
strict
STRING2 INSTRUMENTATION AND CONFIGURATION TOOL

strict

String 2 — strict



String 2 — strict



String 2 — strict

Generated configuration ...

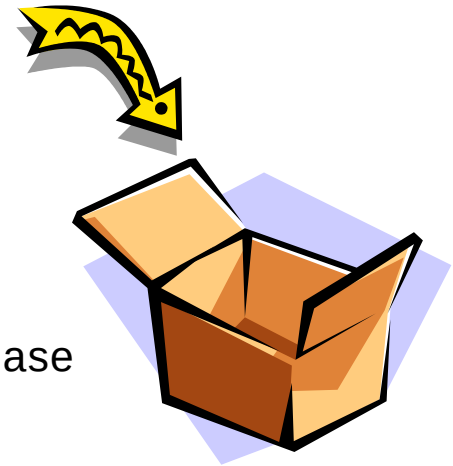
...sets up the DAQ

String 2 — stride

stride

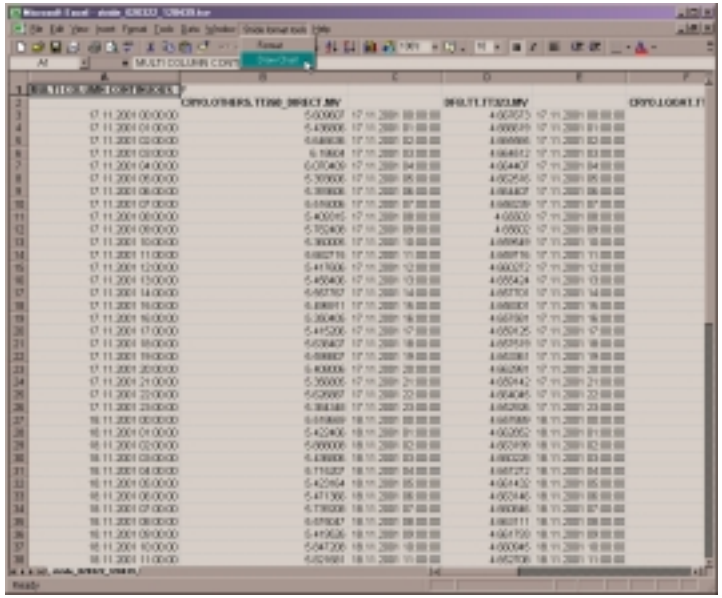
STRING2 DATA EXTRACTOR

SCADA and DAQ post XML data files ...

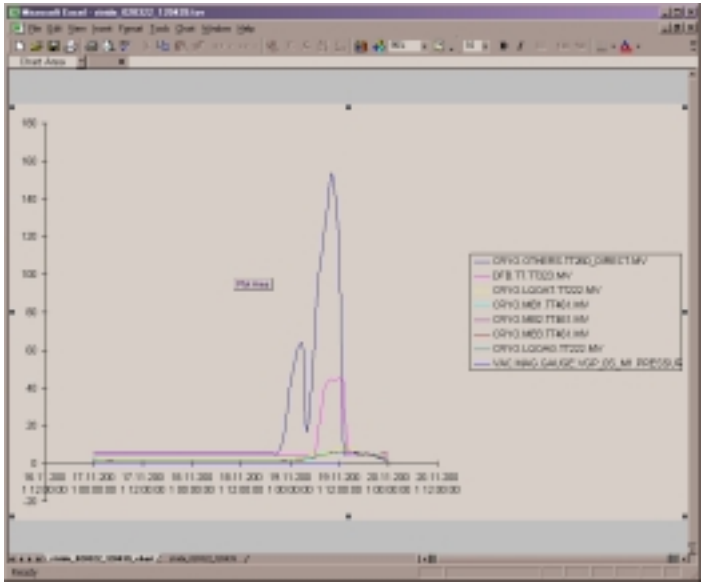


...to **stride** database

String 2 — stride



String 2 — stride



String 2 — So far, so good...

How we benefited?

What did not work as expected?

Phase-by-phase analysis

String 2 — Instrumentation

FACTS

- Central instrumentation database
- Homogeneous instrument naming convention
- Clickable synoptics
- Scalable
  - String 2 – 115m, LHC – 27 km
  - Number of monitored signals – similar order of magnitude (currently 3872)

PROBLEMS

- Signal/DAQ channel
  - Naming and conversion problems
  - Fuzzy responsibility

String 2 — Configuration

FACTS

- Grouping signals into classes
- Aggregate operations applied to classes
  - Assigning triggers, setting acquisition parameters
- One-click DAQ configuration file generation
  - Network independent
- Rapid DAQ configuration switching

PROBLEMS

- Not applicable to SCADA
- Complex conversions from physical to engineering values not compatible with web interface

String 2 — Storage

FACTS

- Central data archive
- Local buffering: no data loss
- Standard based data exchange mechanism
  - XML, HTTP

PROBLEMS

- Performance: slow parsing
- Non-continuous loading
- In-house software on DAQ/SCADA side
- No filtering of noisy/useless data

String 2 — Extraction

FACTS

- Fast and versatile data extractor
- Common interface to DAQ and SCADA data
- Historical configuration browser
- Not an analysis tool
- Rudimentary visualization capabilities provided

PROBLEMS

- Complex conversions not available in the beginning
- Transient data not available on time

String 2 — What we learnt

FACTS

- The overall system provided a prototype functionality of what will be required to observe events like beam loss, quenches, etc.
- Used naturally by people – no training required
  - Unlike String 1, where people developed their tools
  - Careful UI design very important
- A powerful diagnostic tool
  - Easy configuration switching
  - Selective extraction of signal data

String 2 — What we learnt

FACTS

- The system has benefited from
  - Uniformisation of naming of signals
  - Definition of interfaces between the different DAQs and the system
- This could mean for LHC (CP) that a thorough definiton of this is required
- Software technology choices proved good
  - Oracle, PHP, XML

String 2 — What we learnt

PROBLEMS

- Resources for the development
  - Delays in providing required functionality
- Responsibilities on signal ownership
  - Naming, conversions
- Non-integration of SCADA configuration

String 2 — Where we go from here

String 2 Phase II

http://sm18-db.cern.ch

LHC Logging project

http://cern.ch/lhc-logging