# Data Handling Report

LHCb Plenary Meeting

Dec 3rd, 1998

J.Harvey

- News items
- Status of Software Framework
- Status of LCB projects
- Liverpool Farm Project
- Common Approach to multiplexing
- GEANT4 MoU

# COCOTIME

## Requested

- AFS: 100% increases
  - 15 GB extra for users
  - 40 GB extra for project
- 350GB extra shift disk
- 2M CU hours on RSBATCH
  - 1998: 1.2M CU hours
- 2.6M CU hours for simulation
  - 1998: 2M CU hours, 50% used
- Objectivity service
  - 100 GB Raid disk
  - Objectivity lock server
  - Objectivity AMS server

## Granted

- Only 50% of all requests funded
  - Remaining 50% in contingency
- OK (total is 500GB)
- OK
- On PCSF
  - WNT
  - No allocation on CSF (HPUX)
- OK
  - OK
  - OK
  - Use public AMS server

# LHCb simulation & MC production in ‘99

**Responsibilities**:

- MC (SICB) code librarian — A. Tsaregorodtsev
- MC production coordinator — A. Jacholkovska
- MC production, database tools,
  AFS disk space administrator — J.Closier
- Tape management tools — F. Loverre, M. Marin

**Improvements foreseen:**

- MC program quality checking procedure
- Documentation on MC production procedures and tools
- Production status monitor (information on the WWW)
- More detailed description of data samples in the MC database
- Tape allocation and handling tools

**Send mail to Agnieszka.Jacholkowska@cern.ch**

# Software Weeks in 1999

- Increasing activity in development of new software
  - frameworks, algorithms, test beam
- Activity is collaboration wide
  - Nikhef, Orsay, Clermont-Ferrand, Heidelberg, …..
- Need for closer contacts
  - review designs, brainstorming, problem “clinics”, hands-on training
- Weekly computing meeting at CERN
- Aim for 4 software weeks in 1999
  - Feb 8-12   Tutorials in use LHCb Framework + …..
  - May 31 - June 4
  - September 6-10
  - Nov 22-26

# Status of Software Framework

- We are developing a framework to be used by ALL the LHCb data processing applications
- Release 1 (due Dec 18th 1998) allows :
  - Define input and output data, job parameters
  - Loop over events
  - Access MC truth and digitised raw data
  - Output results as histograms and ntuples
  - Provide placeholders for user initialisation and analysis code
- Release 1 does not allow :
  - data to be written back
  - access to reconstruction output
  - use of analysis library (Axlib)

# Status of Software Framework

- ❑ Architecture has been designed and documented (GAUDI)
- ❑ Major design criteria established
  - ➢ clear separation between data and algorithms
  - ➢ three data types : event, detector, statistical data
  - ➢ separation of persistent and transient data
  - ➢ user code encapsulated in in a few places (“algorithms”, converters”)
  - ➢ all components with well-defined interfaces
  - ➢ re-use components where possible
  - ➢ integration technology standards
- ❑ Architecture has been reviewed
- ❑ Coding has started
- ❑ Expect to release to collaboration in January

# Results of Review

- Took place on Nov 26th
- 6 reviewers : architects, domain specialists, physicist
- Very animated and productive discussion
- Several important issues highlighted
- Conclusion was to go ahead and build it
- Give something to users and attack items with highest risk
- Feedback from reviewers very positive
- Discussions should continue among all LHC experiments

# LCB Projects

- Software development SPIDER G.Pawlitzek IT/IPT
  - management of code repository and release tools
  - coding conventions
- Event Filter Farms F.Hemmer IT/PDP
  - demonstrate PCs can be used for online software filtering
  - cluster management/application management/ control and monitoring
  - LHCb/ALICE observers during first year
- Models of Networked Analysis (MONARC) L.Perini INFN/Atlas
  - LHC computer model - role of regional centres, institutes, desktop
  - Small effort from Oxford looking at problem from UK perspective
  - More participants welcome

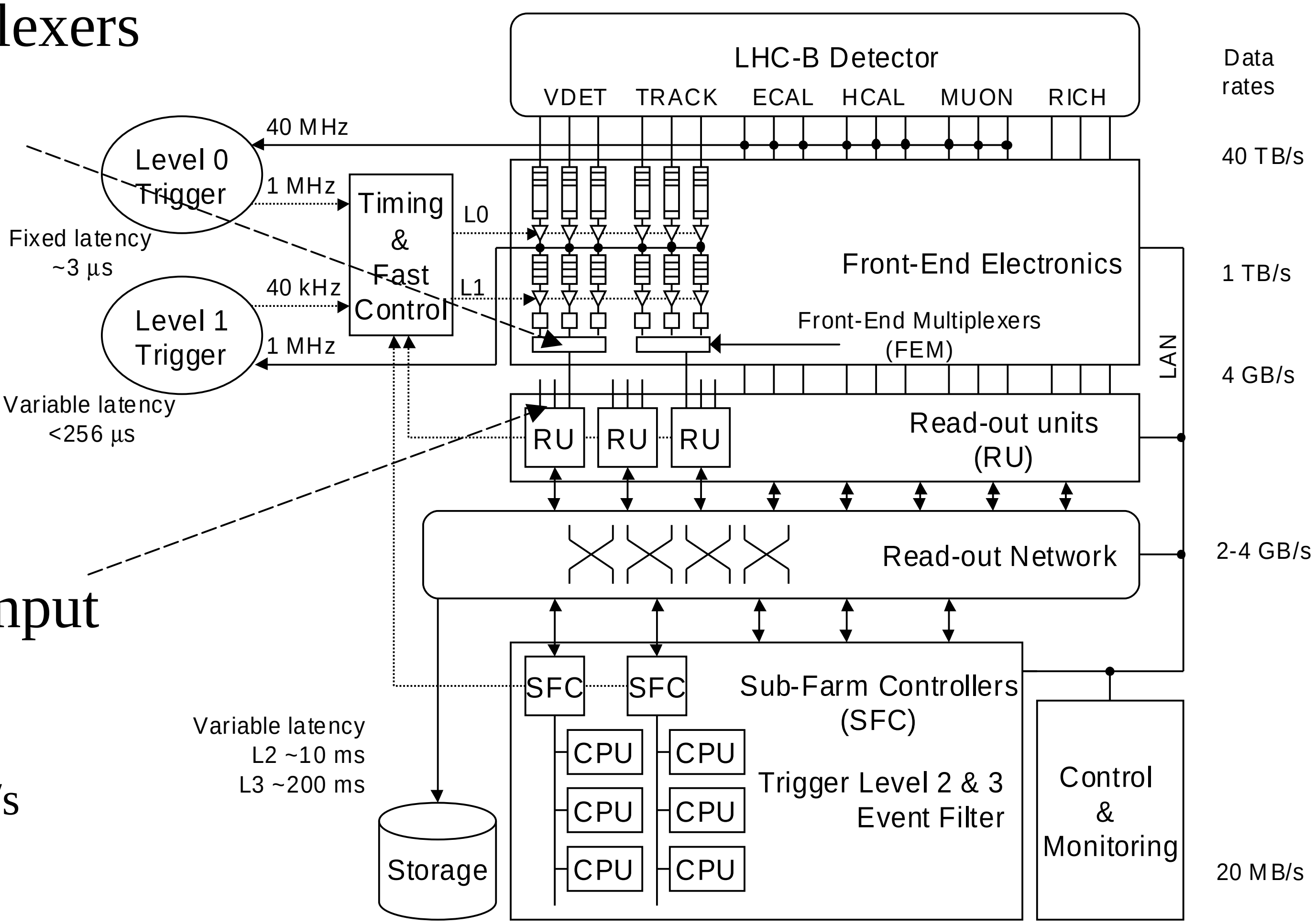
# Farm Project (Themis Bowcock)

- Produce MC data in time for VD TDR
  - signal channels $10^7$ events
  - background channels $3x10^7$ events
    - 120 s of PII/200 time)
  - radiation damage and neutron induced backgrounds
    - $5x10^6$ events at 600s/event
- 500 cpus (266 MHz) and 30-40 TB store
- Built to handle specific computational problem, not a general purpose cpu farm
- Project approval to be announced in December
- Available for general LHCb use
- Collaborate to turn into an LHCb production facility

# Multiplexing (Jose Toledo)

## Front-end Multiplexers

- factor 16
- throughput 40 MB/s




## Multiplexers at input to Readout Unit

- factor 4
- throughput 160 MB/s

# Common Approach

- Provision of a common recursive approach to multiplexing
- Common denominator for interface between DAQ and frontend
- Ease of maintenance and support

# DAQ Workshop

- Establish a working relationship between the online group and the detector online people
- Start defining the components of the DAQ and their behavior and the interfaces between them
- Possible Items to be presented could be:
  - Ideas of detector groups vis-a-vis the DAQ (after L0 Yes and upwards)
  - Data-flow patterns
  - Data formats and formatting
  - Front-End Multiplexing
  - Error detection and handling
  - Fast and slow control
- Contributions solicited….timeframe early February

# GEANT4

- Toolkit for event simulation
- Re-engineered using Object Oriented methods
- Requirements of physicists drive the development
  - Transparency of physics
  - Description of detector geometries based on ISO compliant solid modeler for compatibility with CAD systems
  - Run management handles >1 event simultaneously (event overlap , pile-up)
  - Improved energy loss and multiple scattering models
  - ODBMS solution for storing events
  - Flexible structure for displaying events

# GEANT4 : Organisation and Status

- Project started at the end of 1994
- Collaboration of physicists from 36 institutes
- 10 Working groups
  - Control and event management, Tracking, Particles, Geometry and Transport, Processes and Materials, Electromagnetic physics, Hadronic physics, Detector response, Visualisation, Testing and Quality Assurance, Software Management, Documentation
- First production version announced for Dec 18th 1998
- RD44 project now stops and "Production Service" starts

# GEANT4 :Memorandum of Understanding

- Need some mechanism to formalise the future management of the collaboration
- After discussion collaboration decided to make a Memorandum of Understanding (MoU)
  - Responsibilities of signing parties are to share the tasks of maintenance and support through membership of the various working groups
  - Parties are represented in the Collaboration and Technical Steering Boards
  - Parties benefit from direct support from other contributors
  - Threshold for becoming a party to the MoU
- MoU document is posted on LHCb Computing web pages

# GEANT4 : Recommendation

- I see no alternative to using GEANT4 toolkit to develop our simulation program
- Clear interest that we can follow closely future progress and can influence the programme of work
- Clear we have to put in effort to get expertise in using GEANT4 and to check that it fulfils our requirements
- This effort is accepted as our contribution, so there is no extra cost to us as a result of joining
- Many discussion with authors and CERN management; open to suggestions, gives confidence that we can influence things
- I have recommended to Tatsuya that we sign