

Modelling and Simulation of ALICE DAQ System

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Outline

- ❖ Modelling and Simulation Tool
- ❖ Preliminary Specification
- ❖ Current Status and Performances
- ❖ Next Steps



Modelling and Simulation Tool

- ❖ Foresight (Foresight Systems, Inc.)
 - System level modelling and simulation tool
- ❖ Specification
 - Data Flow Diagrams (event-driven processes, events, control flows)
 - State Transition Diagrams
 - Mini-Specs
 - Real-time Parameters

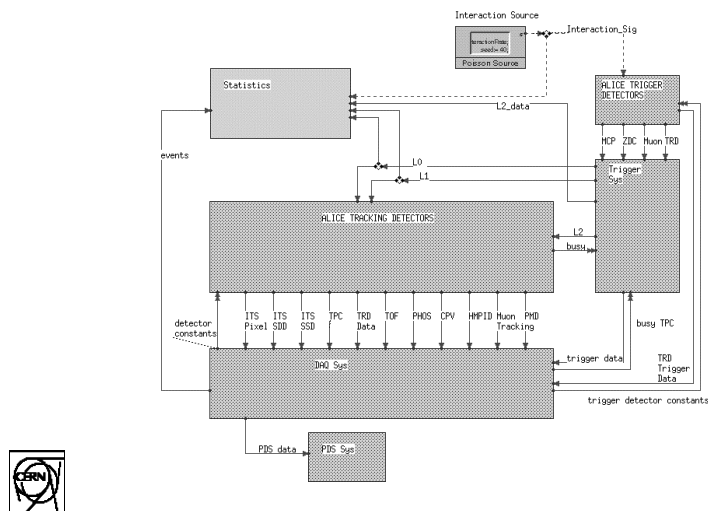


Modelling and Simulation Tool

- ❖ Analysis
 - Type checking, input/output checking, syntax errors
- ❖ Simulation
 - Real-time execution of specification
 - Stand-alone executable specification
 - Animation of Diagrams
 - Real-time constraint validation
 - Debugging functions (breakpoints, monitors windows)
 - Works on Sun workstation



Preliminary Specification Overall Architecture



Current Status

- ❖ Sub-Systems Specification
 - Trigger System (completed)
 - Tracking Detectors (completed, with finite buffer, generic)
 - DAQ (maximal bandwidth)
 - PDS (sink)



Trigger System

❖ 3 Levels Trigger

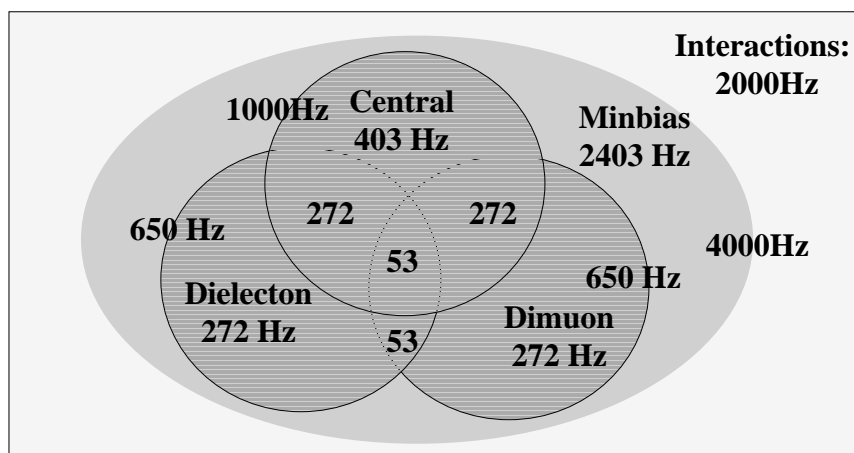
- L0 : performs P/F protection + busy check
check at 0, send information at 1.2 μ s.
- L1: performs P/F protection (changes detector classes if necessary)
check at 4.3 μ s, send information at 5.5 μ s.
- L2: performs P/F protection (changes detector classes if necessary)
check at 88 μ s, send information at 89.2 μ s
- L0, L1, L2 arrives in order (L0 L1 L0' L1' L2 L2' is possible)

❖ Parameters P/F Protection

- dimuon: 3 μ s
- dielectron: 7 μ s
- other: 88 μ s



Event Rates: L0 Input



All Events: 6000 Hz



Performances**Infinite Buffer, All Events**

	L0	L1	L2	L0 %	L1 %	L2%
Central	248	242	186	3.7	3.6	3
Dimuon	327	324	556	5.2	5.1	9.1
Dielectron	260	252	354	4.3	4.2	5.8
Minbias	1361	1323	798	23	22	13
Misc	385	377		6.5	6.4	
Interaction	1997			33		
Total	2581			43		

After 1 sec (6038 ev)
Poisson (6000 Hz)

**Performances****Finite Buffer, Maximal Bandwidth, All Events**

	L0	L1	L2	L0 %	L1 %	L2%
Central	66	66	53	1.1	1.1	0.91
Dimuon	546	539	608	8.8	8.6	9.9
Dielectron	81	78	112	1.4	1.4	1.9
Minbias	420	405	251	7.3	7.1	4.3
Misc	116	119		2.06	2.01	
Interaction	1997			33		
Total	1229			20.8		

After 1 sec (6038 ev)
Expected L2:

Central = 20, Dimuon = 650, Dielectron=200, Minbias=20



Detectors Parameters

TPC and TRD

	Bufur Size	Read T.	Reset T.	Transm.	Throw T.	Centr. Up	Centr. Lo
TPC	4	100 μ s	0.1 μ s	18000MB/s	1 μ s	75.9MB	56.1MB
TRD	4	50 μ s	0.1 μ s	1800 MB/s	1 μ s	8 MB	8MB

- Generic Detectors
- TPC, TRD fill buffer
- TRD “worse” than TPC
(has more frequently a full buffer)



Next Steps

❖ DAQ Sub-System

- DAQ (with DDL, RORC, FEDC, bandwidth, etc.)
 - Specification of whole DAQ (396 DDL, 240 LDC, 100 GDC)
 - Maintain reasonable size for specification (parameters)
 - Simulation of parallelism
- Collect specific parameters of each detector

❖ Evaluation of Performances with real bandwidth

- Whole system
- For each detector

