

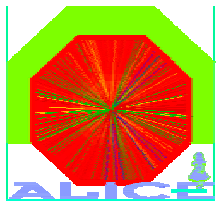
# ALICE

# Trigger and DAQ

LHC Days in Split  
October-2004

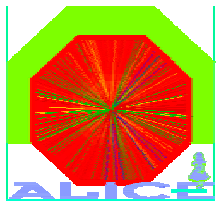
P.Vande Vyvre - CERN/PH

for the ALICE DAQ project  
(Birmingham, Budapest, CERN,  
Mexico, Split, Zagreb)



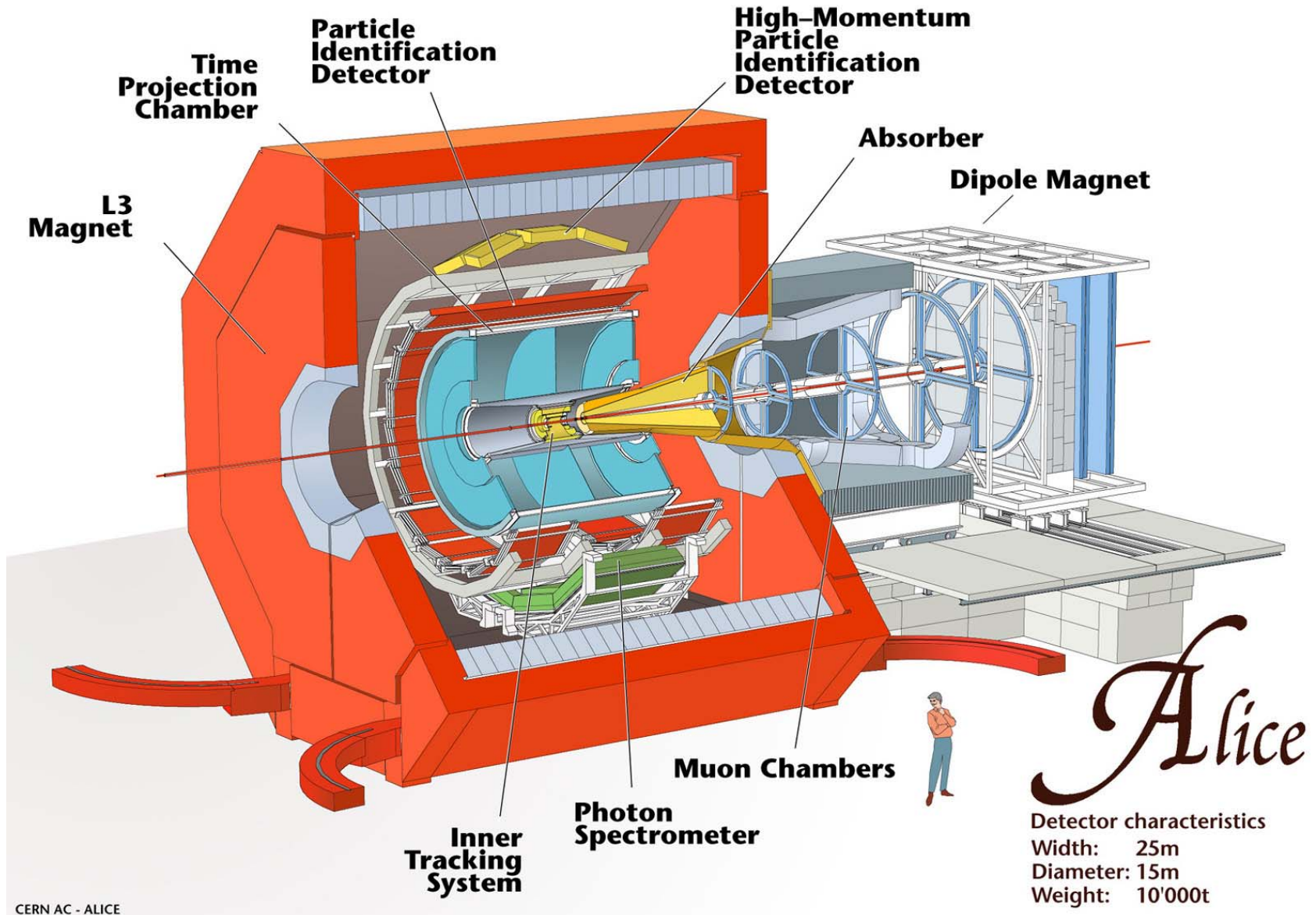
# Outline

- ALICE DAQ
  - Trigger/DAQ logical model - Requirements
  - Trigger/DAQ at LHC
  - ALICE Trigger/DAQ Architecture
- Hardware components
- Software packages
- Towards the final ALICE
- Conclusions



# Outline

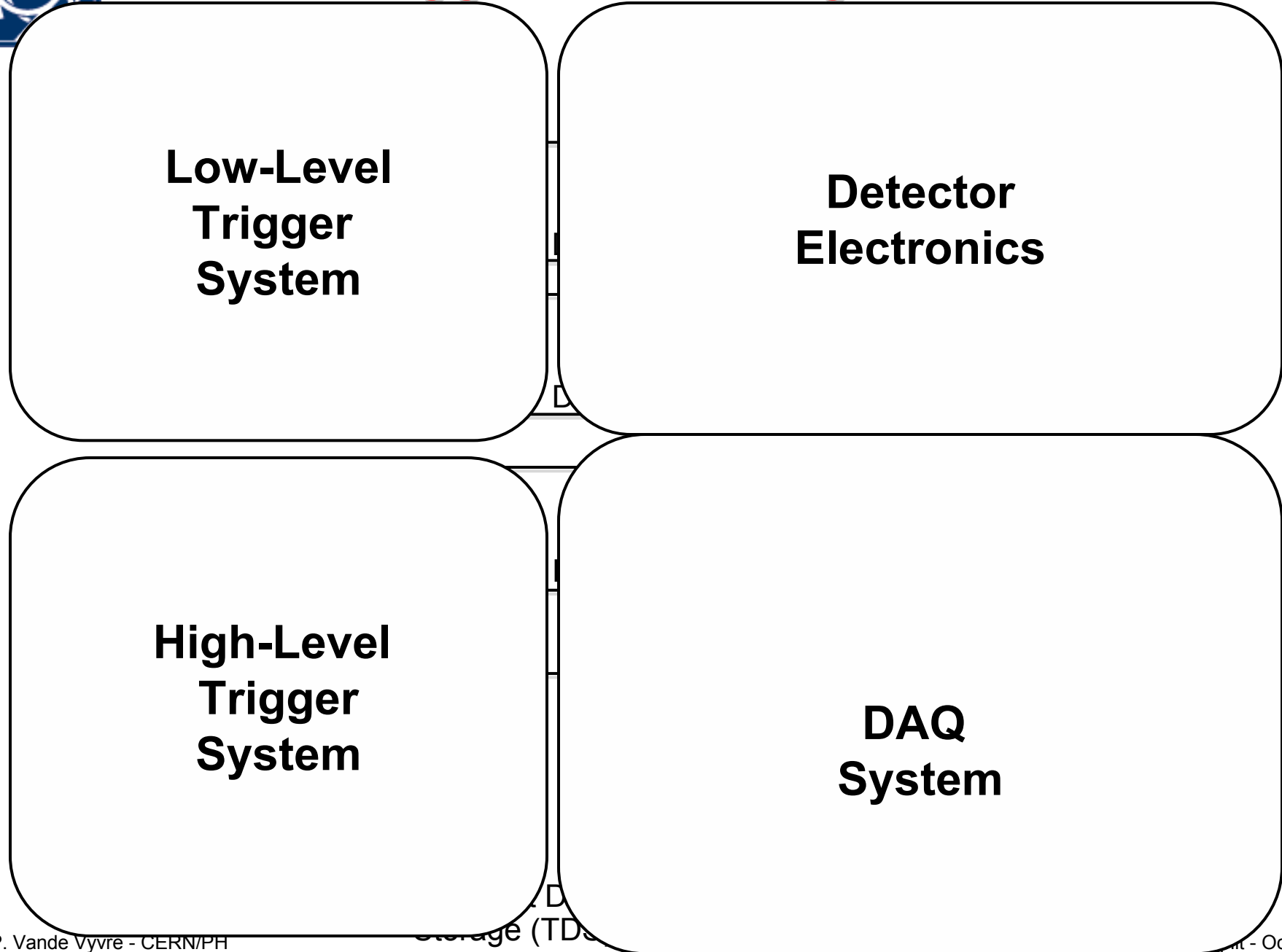
- **ALICE DAQ**
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CERN AC - ALICE



# Trigger & DAQ logical model





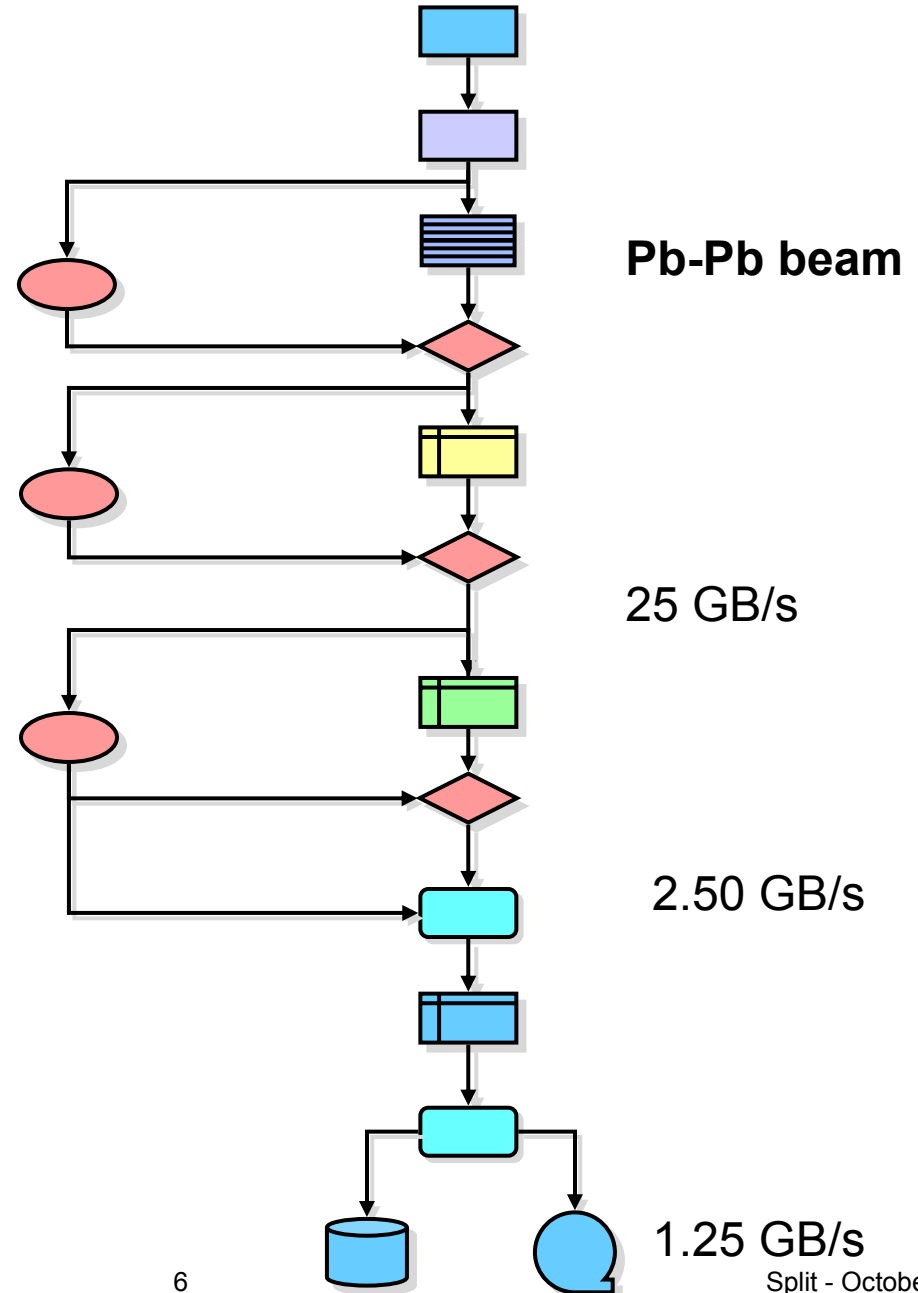
# ALICE Physics requirements

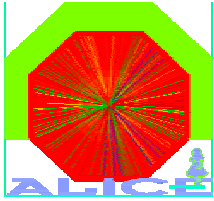
## Pb-Pb beam

	Rate	Max. ev. size
- Central	20 Hz	86.0 MB
- MB	20 Hz	20.0 MB
- Dimuon	1600 Hz	0.5 MB
- Dielectron	200 Hz	9.0 MB

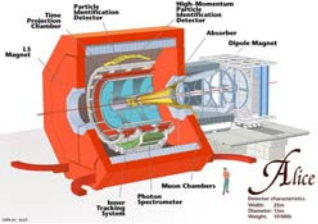
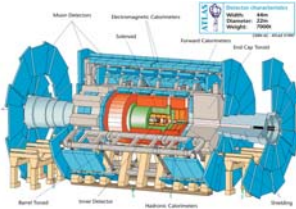
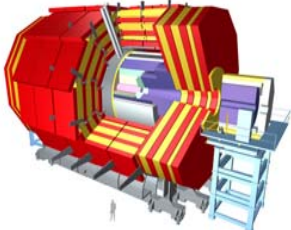
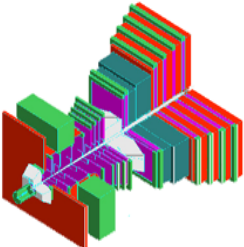
## pp beam

MB	100 Hz	2.5 MB
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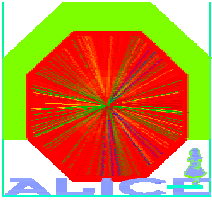


# DAQ @ LHC

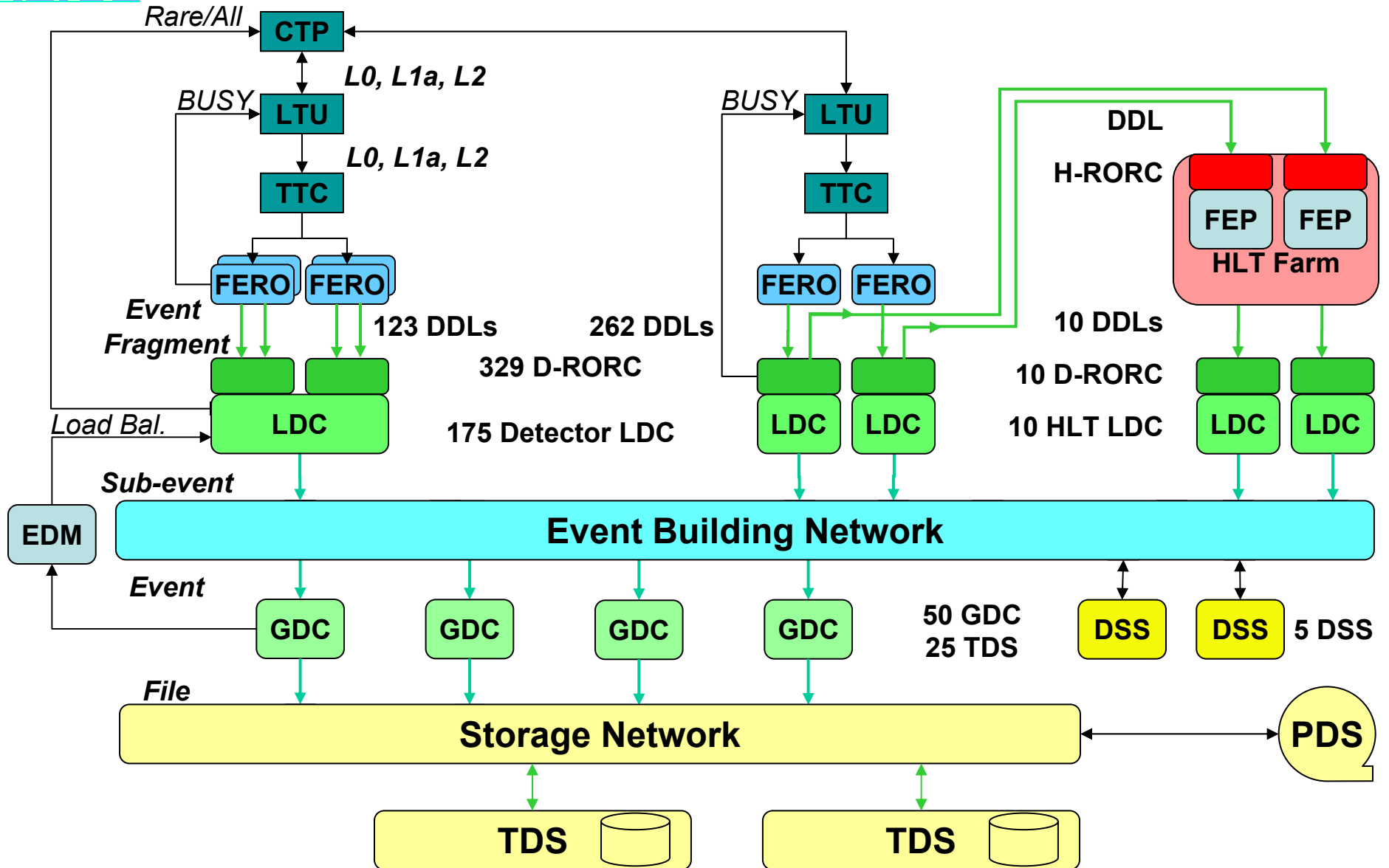
	LHC Beam	Event Size (Byte)	Readout (HLT input) (Events/s.) (GB/s)	
<b>ALICE</b> 	Pb-Pb	$4 \times 10^7$	$2 \times 10^3$	25
<b>ATLAS</b> 	pp	$10^6$	$2 \times 10^3$	10
<b>CMS</b> 	pp	$10^6$	$10^5$	100
<b>LHCb</b> 	pp	$2 \times 10^5$	$40 \times 10^4$	4

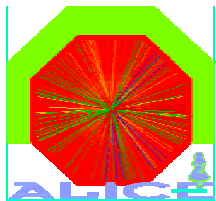






# ALICE TRG/DAQ architecture





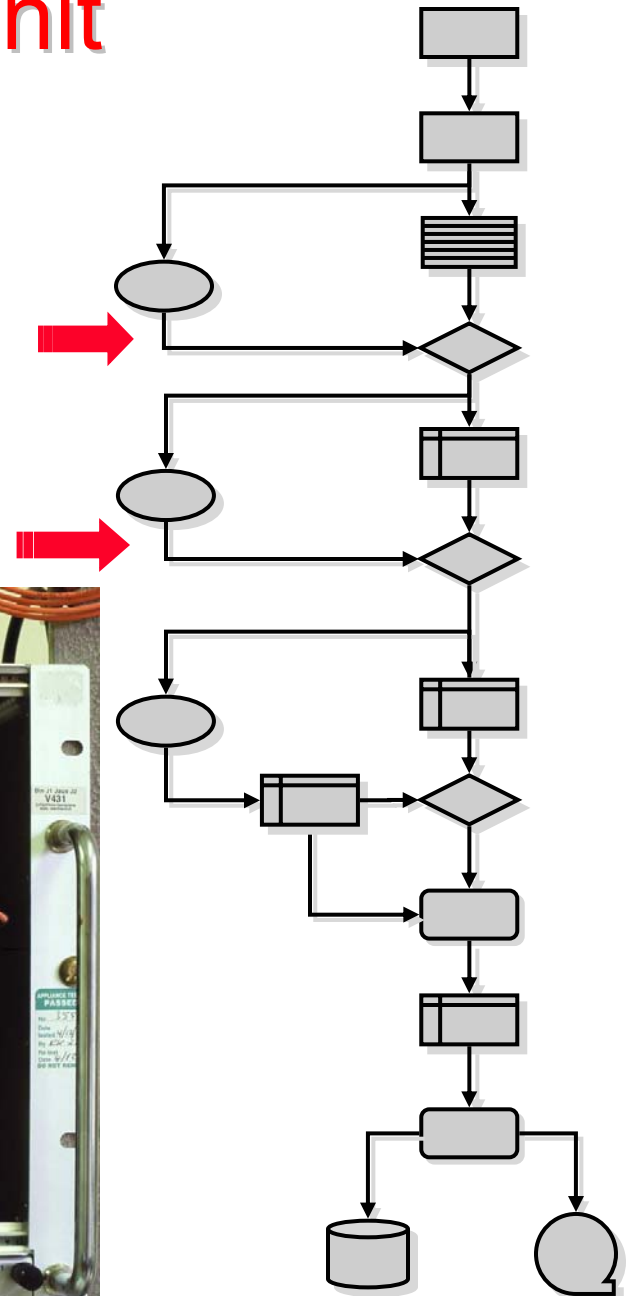
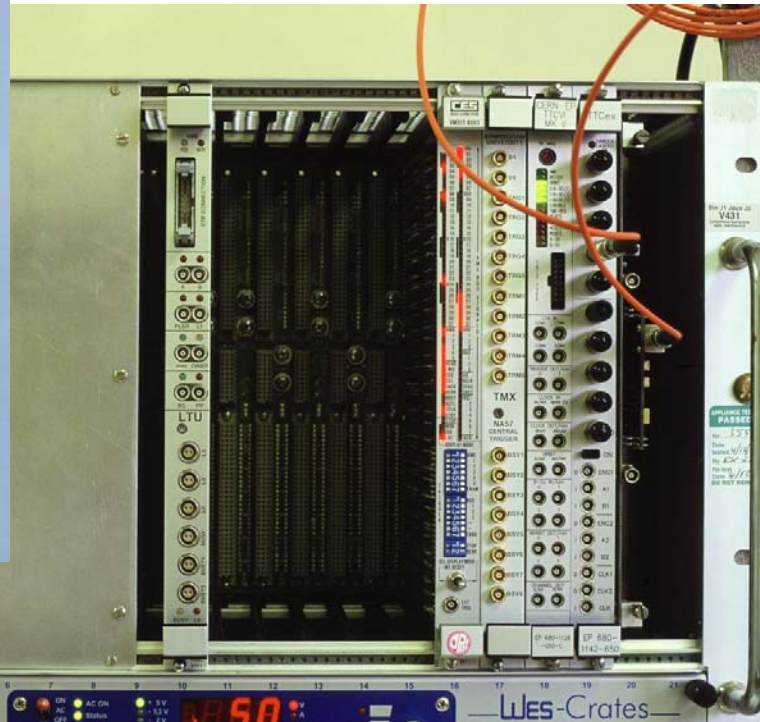
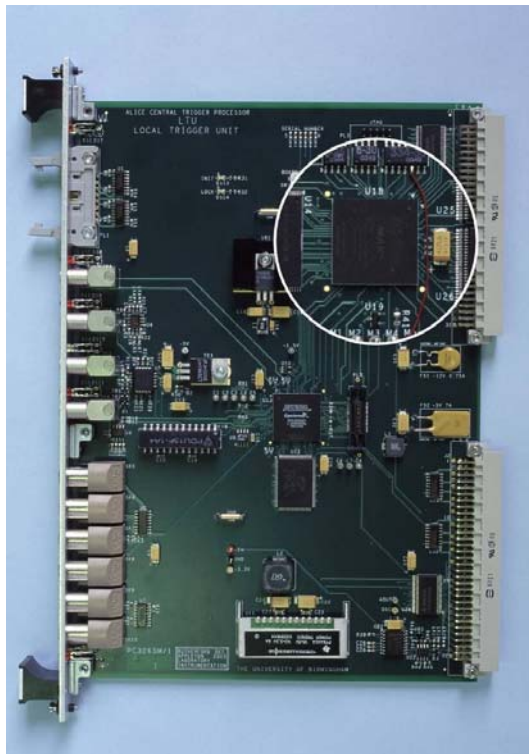
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# Local Trigger Unit

- ◆ Common interface between Central Trigger Processor to TTC tree of each detector





# Trigger Control Software

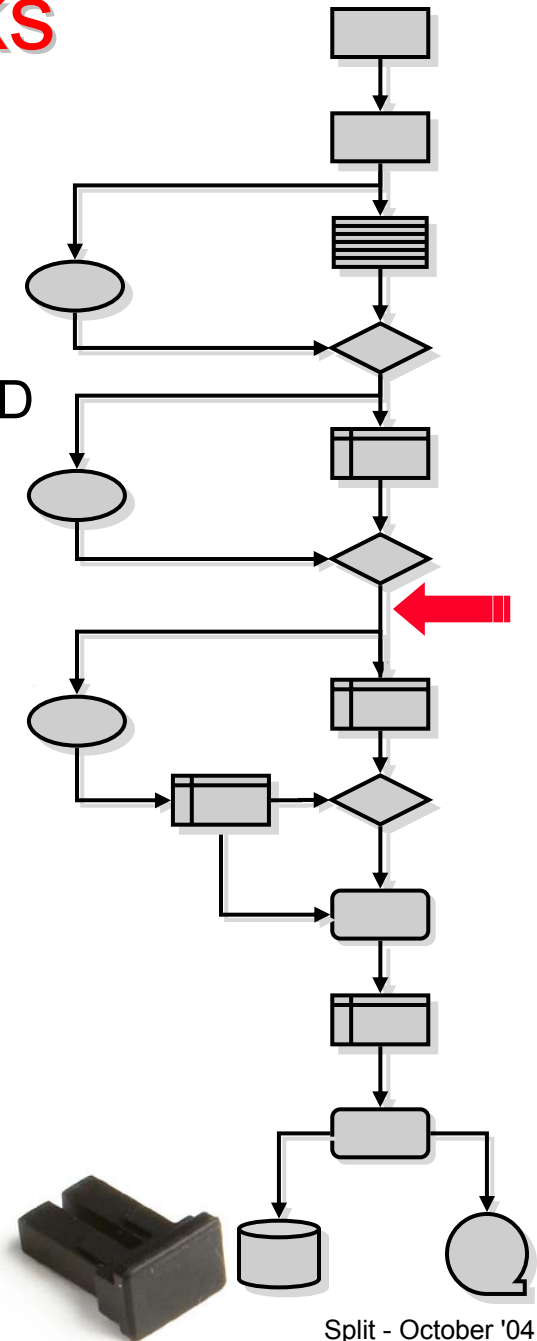
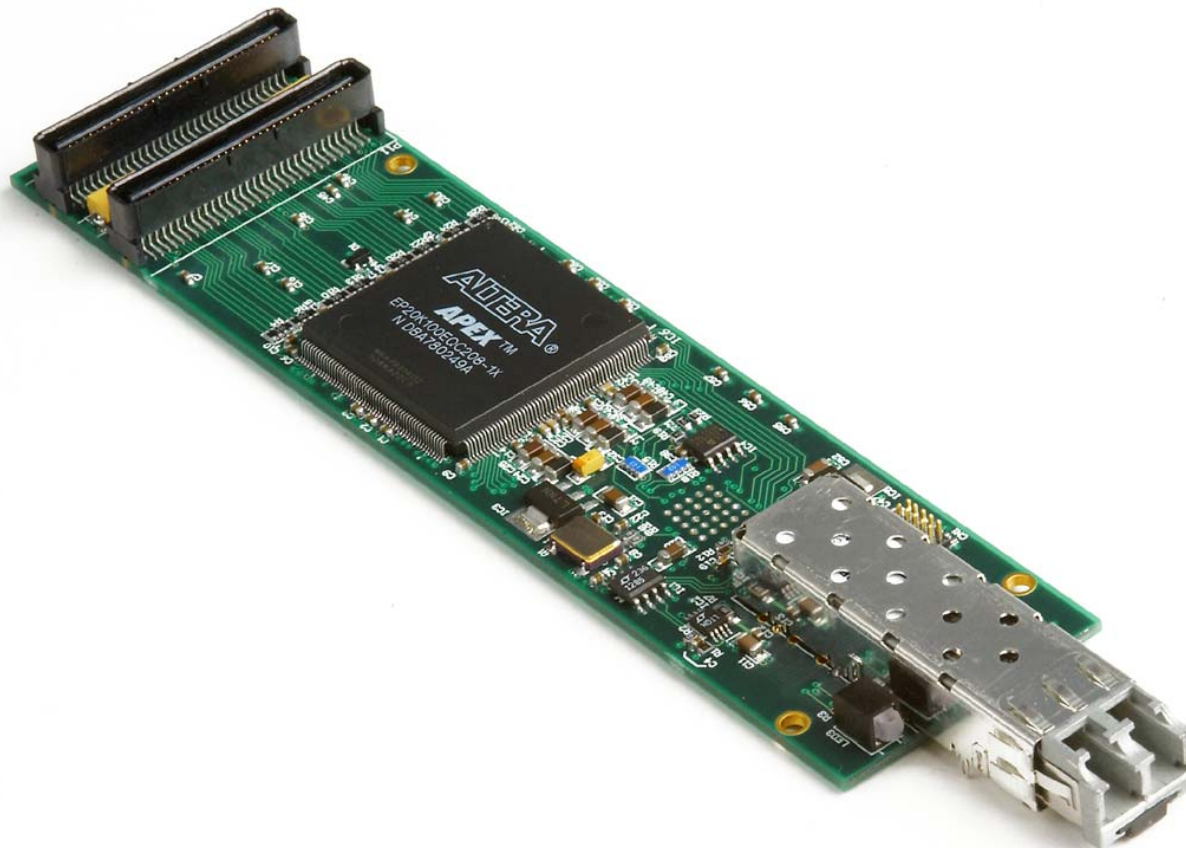
The screenshot displays the Trigger Control Software interface, which is organized into several windows:

- VME crate:** A window on the left containing a grid of buttons for various modules. The top row has 'ltu' and 'ltcvi'. Below are 'stdfuncs', 'CTP\_Emulator', 'Configuration', 'Testing', 'Monitoring', 'SimpleTests', 'SLM', and 'MasterTest'. A second column contains 'ltcvi', 'stdfuncs', 'InpSelTiming', 'sendL1L2', and 'primitives'. A 'quit' button is at the bottom.
- 0xA00000:** A window showing the command line interface for a process with PID 2407. The output includes 'initmain called...' and 'pcsr1()' followed by the sequence '1, 7, 9, 0, 1, 1, 0, 1, 7'.
- 0x810000:** A window showing the command line interface for a process with PID 2404. The output includes 'LTUcode:56 serial#:3f VME ver:a3 LTUfpga:a4' and 'BC\_STATUS: 2'.
- CTP emulator:** A large window in the foreground with a pink background. It features a 'Sequence:' field with 'L0.seq', a 'Load sequence' button, and a 'Sequencer editor' button. Below this is an 'Errors enabled' section with an 'error signal rate:' field set to '10 Hz' and a note 'Error generation allowed for: L0 L2a'. Under 'Error on demand:', there are buttons for 'Pre-pulse error', 'L0 error', 'L1 error', 'L1 Message error', 'L1&L1 Message error', 'L2a Message error', and 'L2r Word error'. At the bottom, there are buttons for 'Generate 1 'Start signal'', 'Automatic START signal selection:' (set to 'not selected'), 'Start emulation', 'Break emulation', and 'Quit emulation'.
- Input s:** A window on the right with a 'Counting:' field set to 'orbits', a 'Trigger src:' dropdown set to 'Disabled', and a 'Frequency:' field. Below these are several status indicators: 'BC delay: s', 'VME OK', 'L1A FIFO emp', 'L1A FIFO not', 'L1A FIFO:', 'Orbit:', and 'set CSRT'. A 'quit' button is at the bottom. A dropdown menu is open, showing options: 'L1A0', 'L1A1', 'L1A2', 'L1A3', 'VME', 'Random', 'Calibration', and 'Disabled'.



# Detector Data Links

- ◆ Standard and stable interface detector/DAQ
- ◆ Point-to-point full-duplex digital data link
- ◆ Massive parallelism (100's)
- ◆ Integrated with SDD, TPC, TRD, TOF, Muon, HMPID

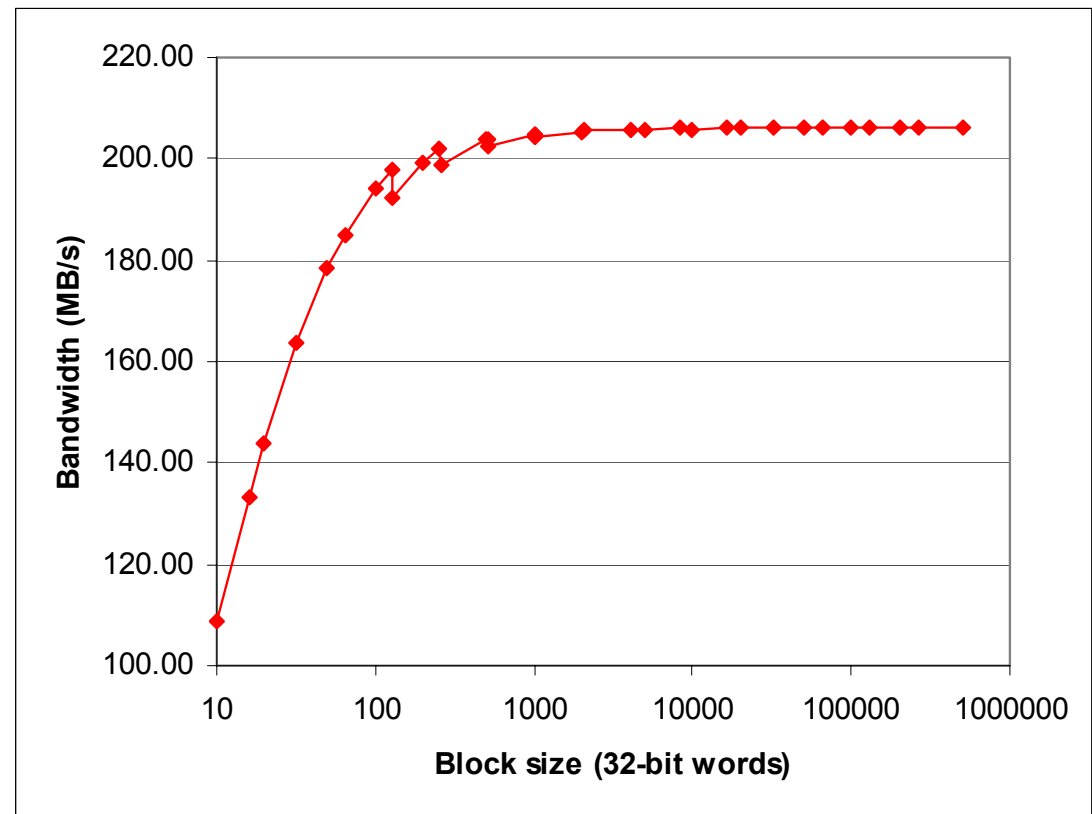




# Link performance

- ◆ HEP development based on commodity components:
  - Fiber Channel or Gig. Ethernet: 2.125 Gb/s
  - Optical transceiver 850 nm VCSEL
  - Flash-based FPGA (Radiation tolerant)

200 MB/s sustained  
Lots of bw available.  
Major fraction available to  
end application.

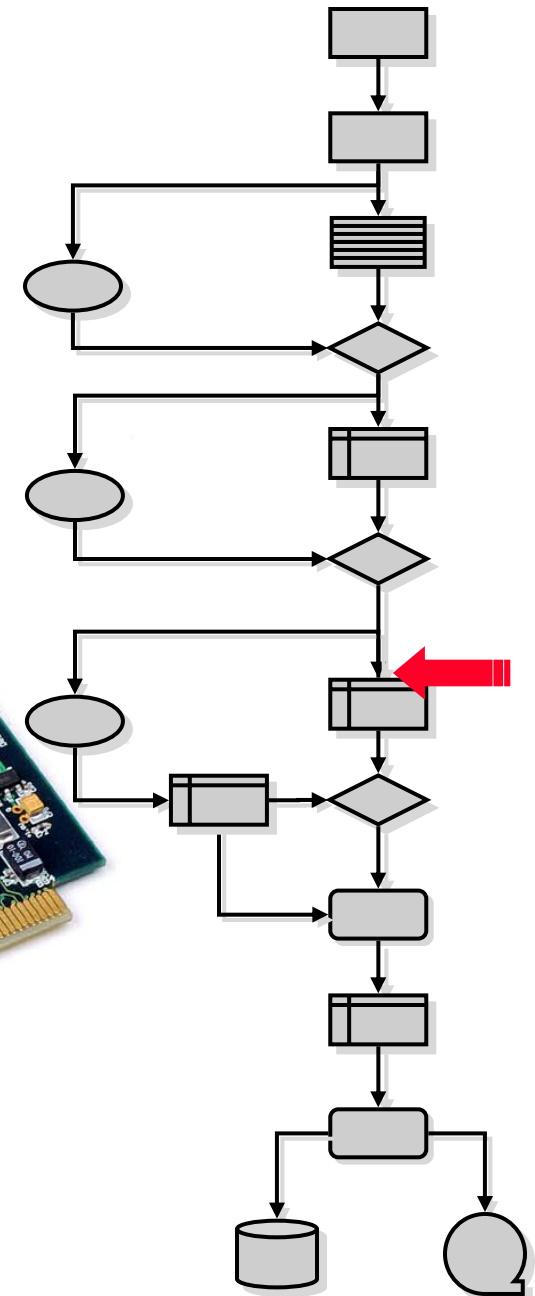
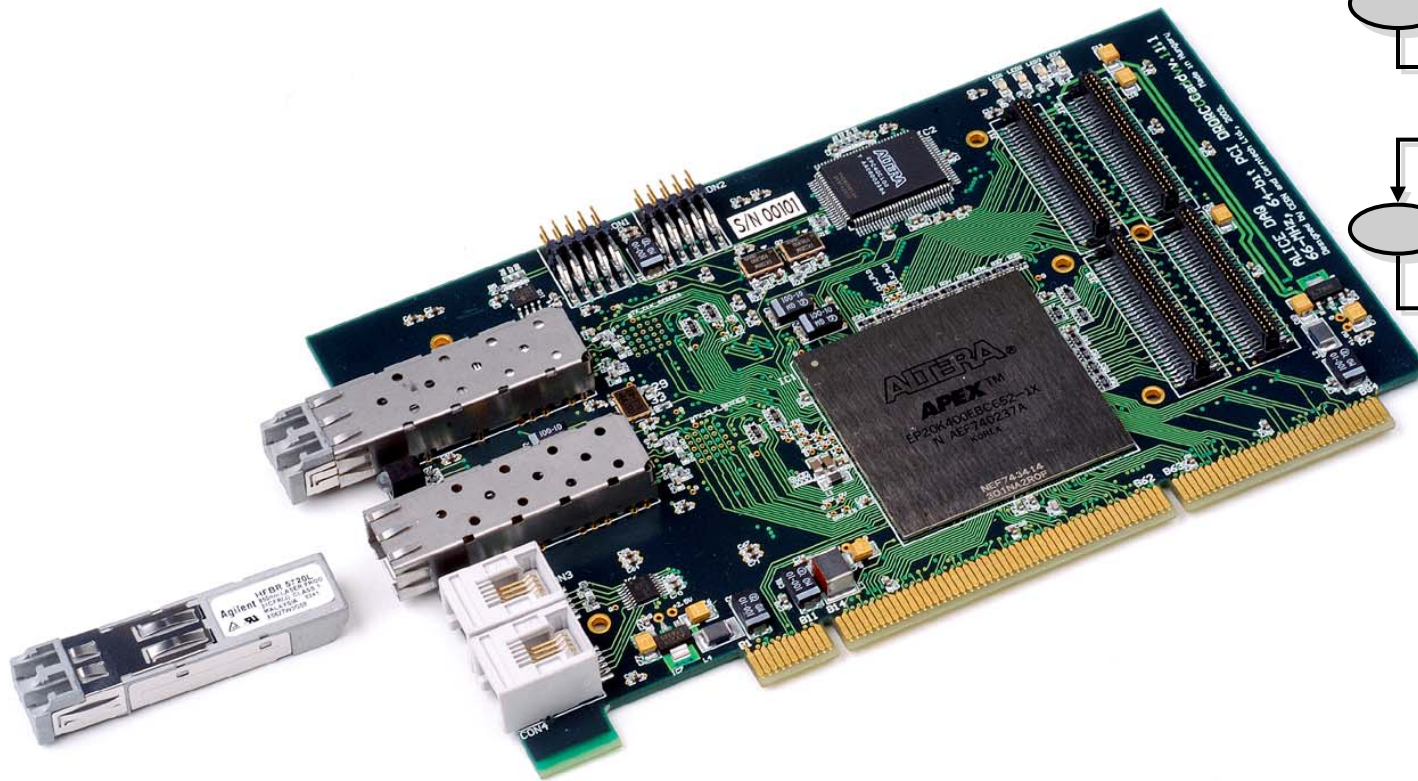






# Links Adapters

- ◆ Adapter for 1 or a few links to PC I/O bus
- ◆ A few-to-one multiplexer
- ◆ Massive parallelism (100's)





# Link and adapter performance

- ◆ Currently PCI and PCI-X busses. PCI-XP (PCI Express) in the future.
- ◆ No large local memory. Fast transfer to PC memory
- ◆ PCI interface
  - IP core (VHDL code synthesized in FPGA)
  - PCI 64 bit 66 MHz. Master enabled.

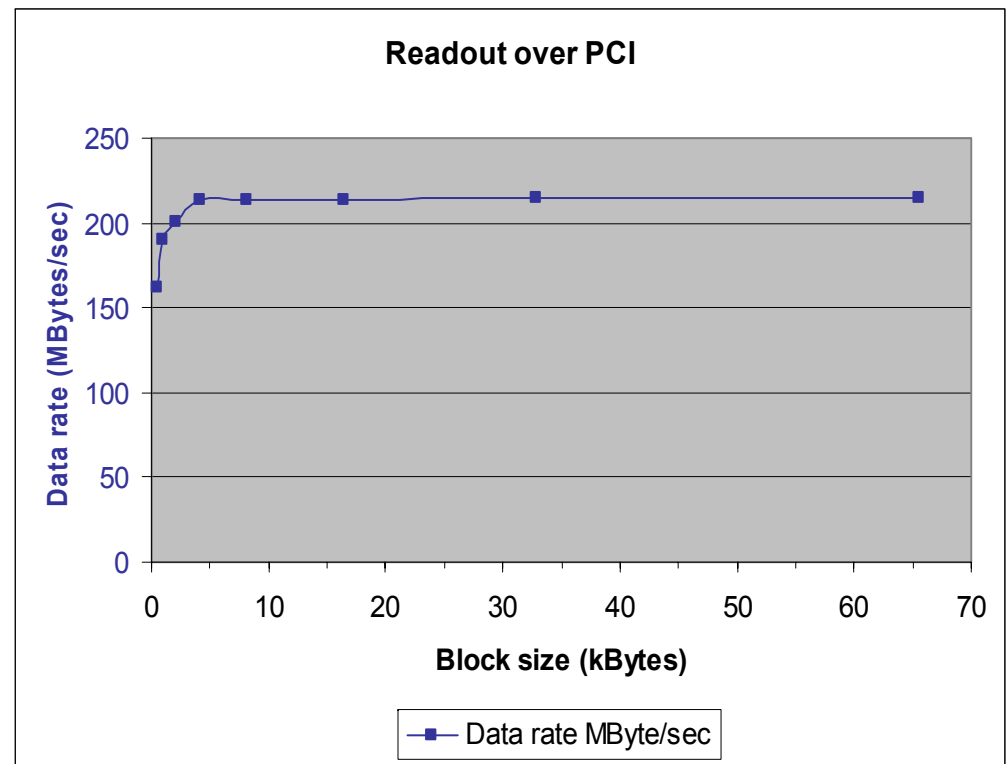
200 MB/s sustained

Total PCI load: 92 %

Data transfer PCI load: 83 %

Lots of bw available.

Major fraction available to end application

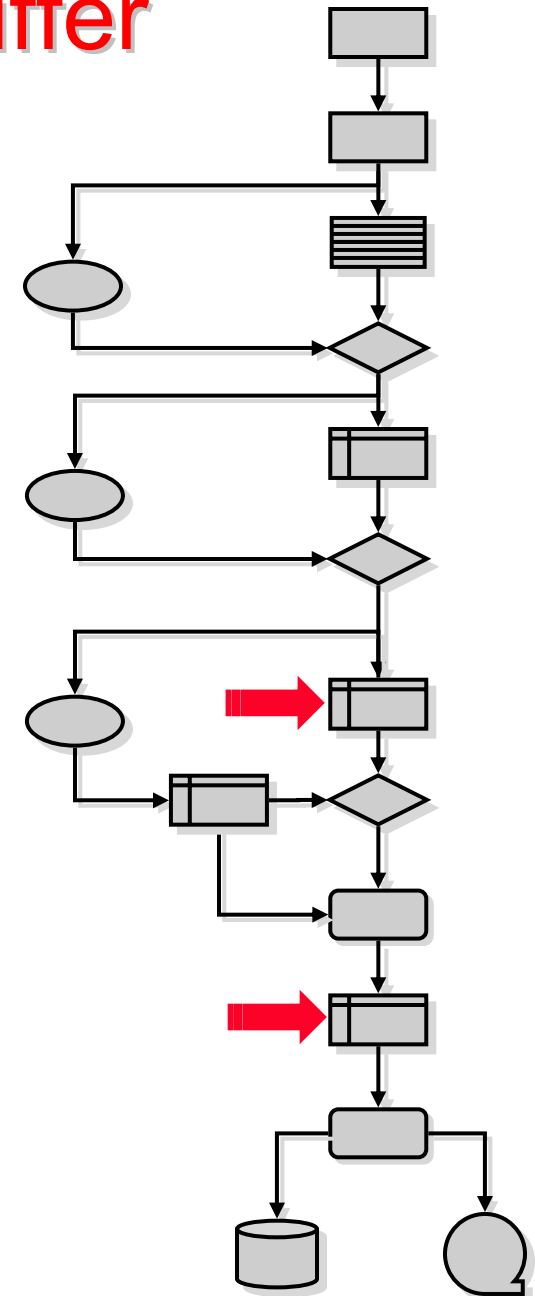






# Subevent & event buffer

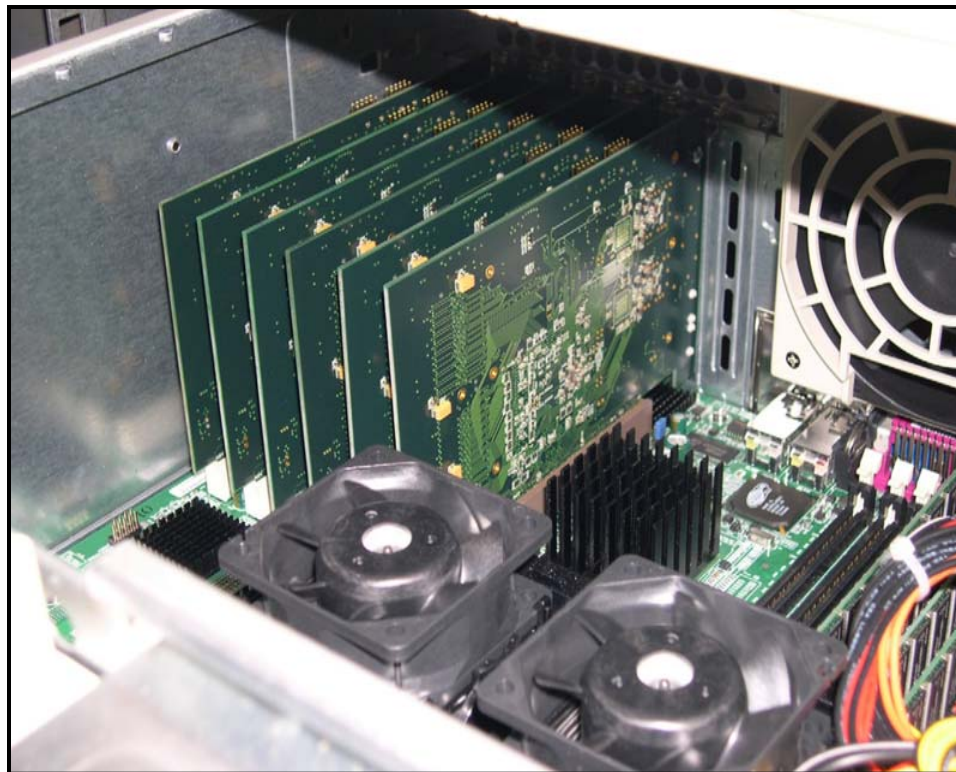
- ◆ **Baseline:**
  - Fast dual-port memories
  - Electronics racks are over
  - Extensive use of dual-CPU PCs
- ◆ **Key parameters:**
  - Cost/performance
  - Performance: I/O and memory bandwidth





# Readout System Performance

- ◆ Supermicro server motherboard with dual Xeon CPUs @ 2.4 GHz
  - In the future: multicore CPUs from Intel and AMD
- ◆ Six PCI-X slots, 4 bus segments (3+1+1+1)
- ◆ Linux OS
- ◆ ALICE Data-Acquisition software (DATE)





# Performance: 6 D-RORCs

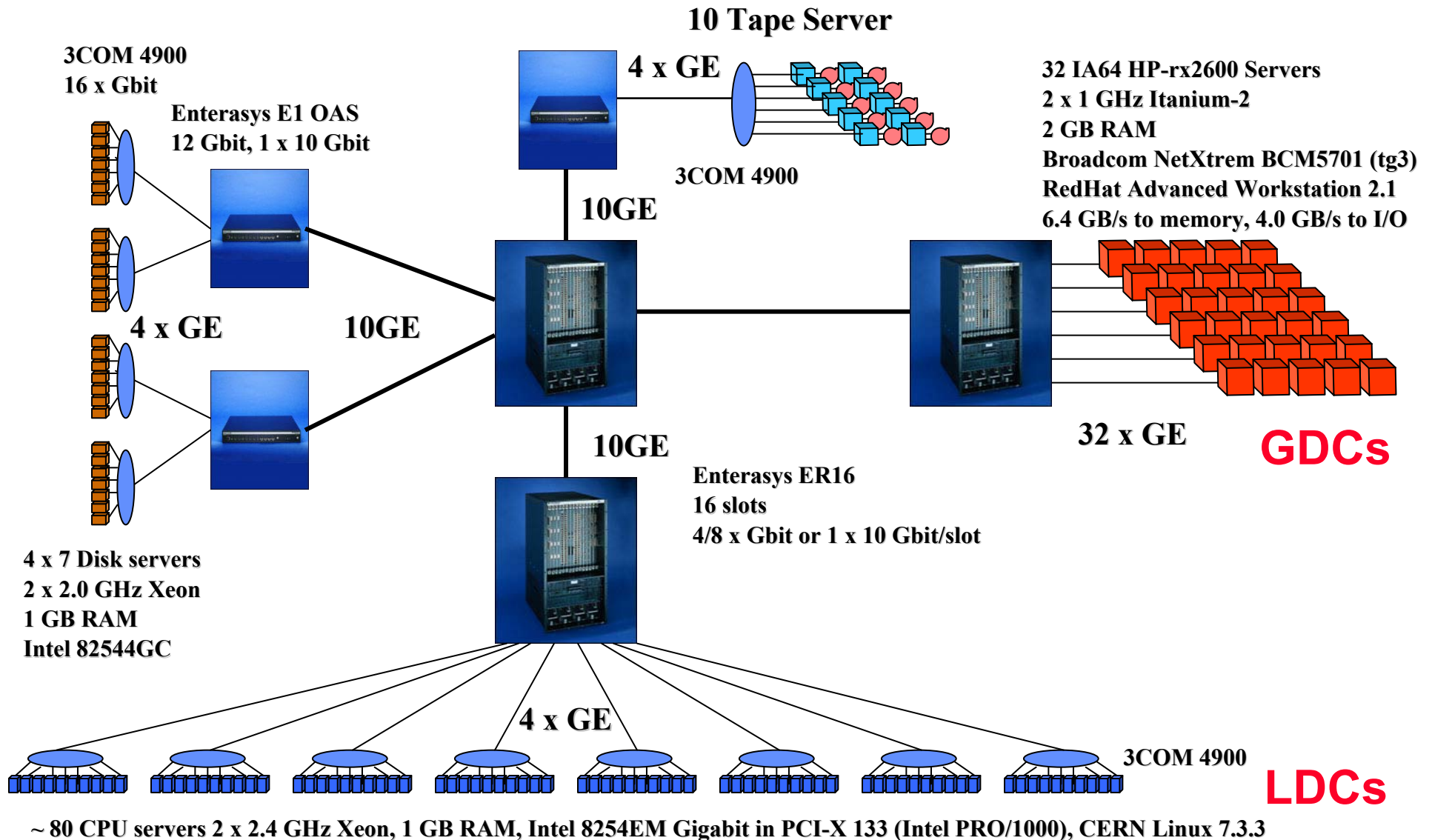
- ◆ Testing the fully populated PC using data source internal to PCI interface
  - Interoperability test
  - Measure the maximal input bandwidth

#2	#4	PCI #6						1 Ch	1 Ch	
	#3	PCI #5					1 Ch	1 Ch	1 Ch	
Controller #1	Segment #1	#2	PCI #4			1 Ch	1 Ch	1 Ch	1 Ch	
			PCI #3			1 Ch			1 Ch	
			PCI #2		1 Ch	1 Ch				1 Ch
			PCI #1	1 Ch	1 Ch	1 Ch	1 Ch	1Ch	1 Ch	1 Ch
			<b>Bandwidth [MB/s]</b>	<b>264</b>	<b>464</b>	<b>424</b>	<b>528</b>	<b>792</b>	<b>1045</b>	<b>840</b>
			<b>Normalized Bandwidth [MB/s/Ch]</b>	<b>264</b>	<b>232</b>	<b>141.3</b>	<b>264</b>	<b>264</b>	<b>261.3</b>	<b>140</b>



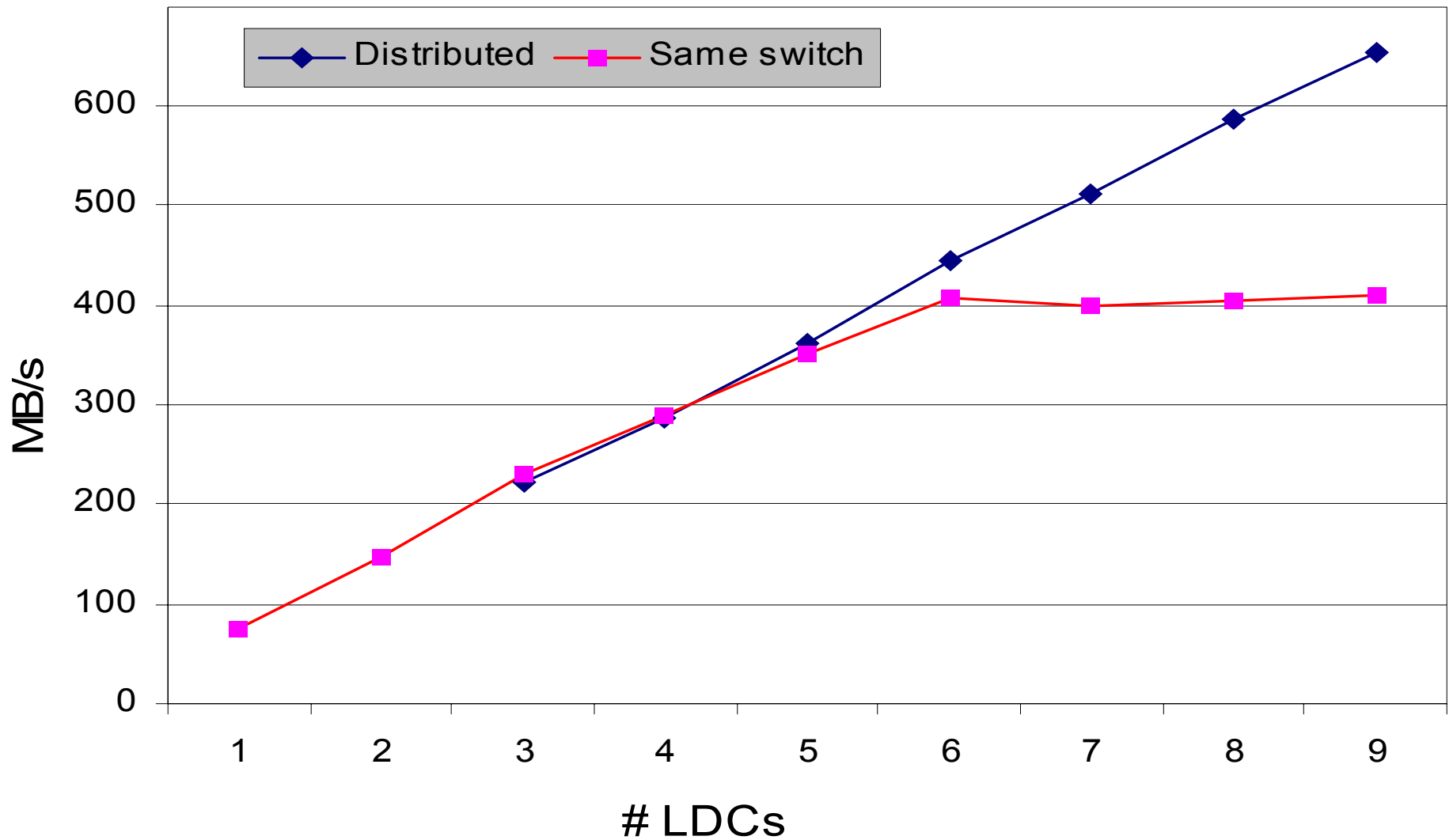


# 2003 ALICE Data Challenge (ADC V)





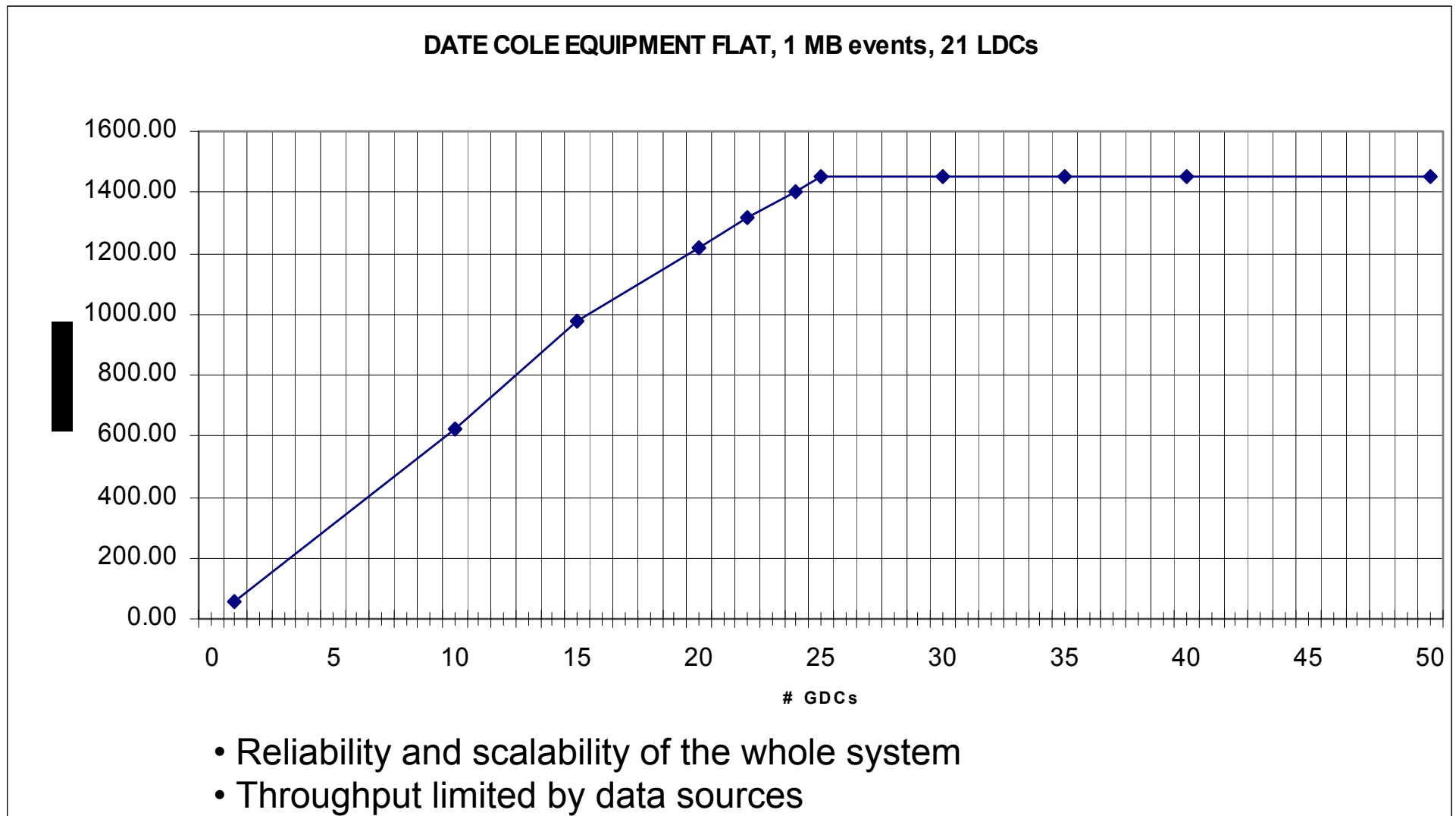
# ADC V Trunking



Trunk of 4 x Gb Eth



# Scalability of network-based event building





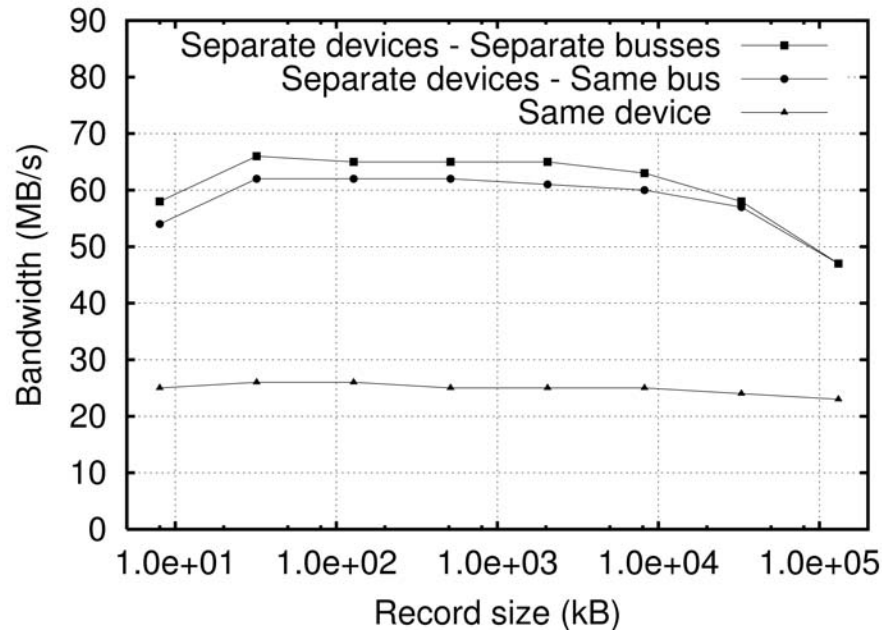
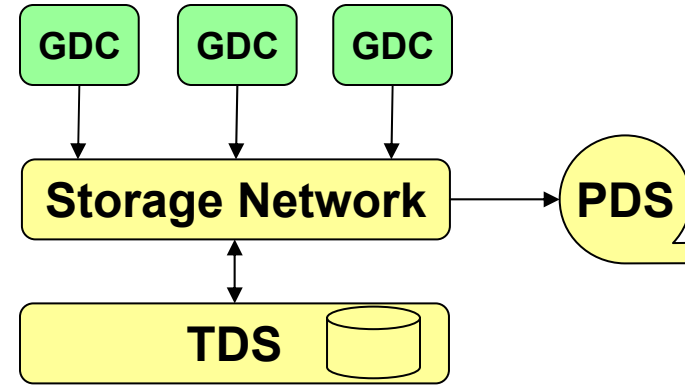
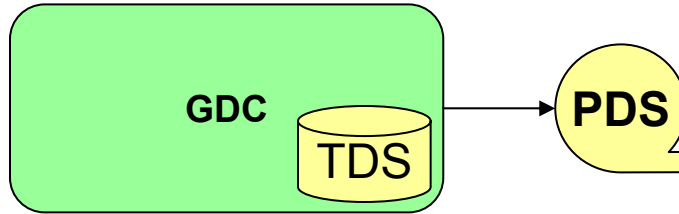
# Mass Storage System

- ◆ Logical model: distributed file-system
- ◆ Software implementation
  - CASTOR system developed by CERN/IT
  - Accessibility via the GRID
- ◆ Baseline hardware implementation
  - Transient Data Storage
    - Located at the experimental area
    - Capacity: a few hours of autonomous data taking
    - Before archiving to tertiary storage, if any
  - Permanent Data Storage
    - Located in the computing centre
    - Infinite capacity, very low cost
    - Single write and a few read
    - Sufficient performance to achieve performances with reasonable number of parallel streams and media operations
      - ◆ 1 GByte/s: 40 active streams at ~30 MB/s
      - ◆ 1 media operation every 2'30'' with 200 GB/volume
  - Open to new implementations thanks to software model

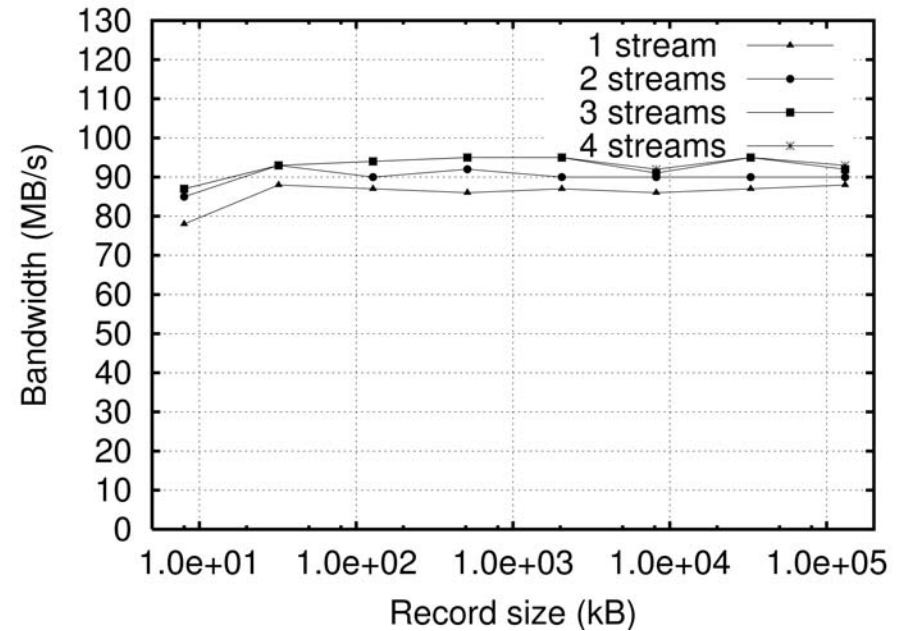




# Possible Transient Storage



- ◆ TDS: local GDC storage
- ◆ Storage attachment: internal IDE

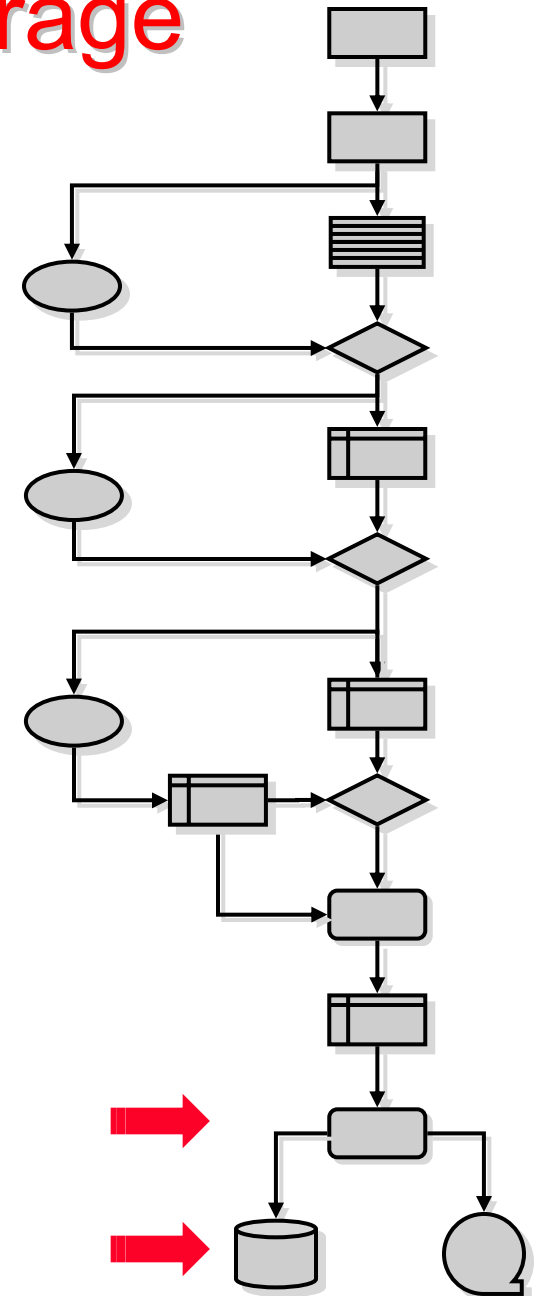


- ◆ TDS: storage array
- ◆ Storage attachment: Fibre Channel



# Transient Data Storage

- ◆ Transient data storage at the experimental area
- ◆ Baseline
  - Storage arrays of commodity disks
  - Box attachment: Fibre Channel
  - Disk attachment: IDE or serial-ATA
  - RAID-level
- ◆ Partnering with industry for test of equipment
- ◆ Key selection criteria:
  - Cost/performance
  - Bandwidth/box
  - Robustness





# Storage Arrays

## ◆ dotHILL SANnet II 200 FC

- 12 fiber channel disk slots
- 1 GB cache
- 1 x 2Gbit fiber host channel



## ◆ Infortrend IFT-6330

- 12 IDE drive slots
- 128 MB cache
- 2 x 2Gbit fiber host channels



## ◆ Infortrend EonStor A16F-G1A2 (INFN CASPUR Storage Lab)

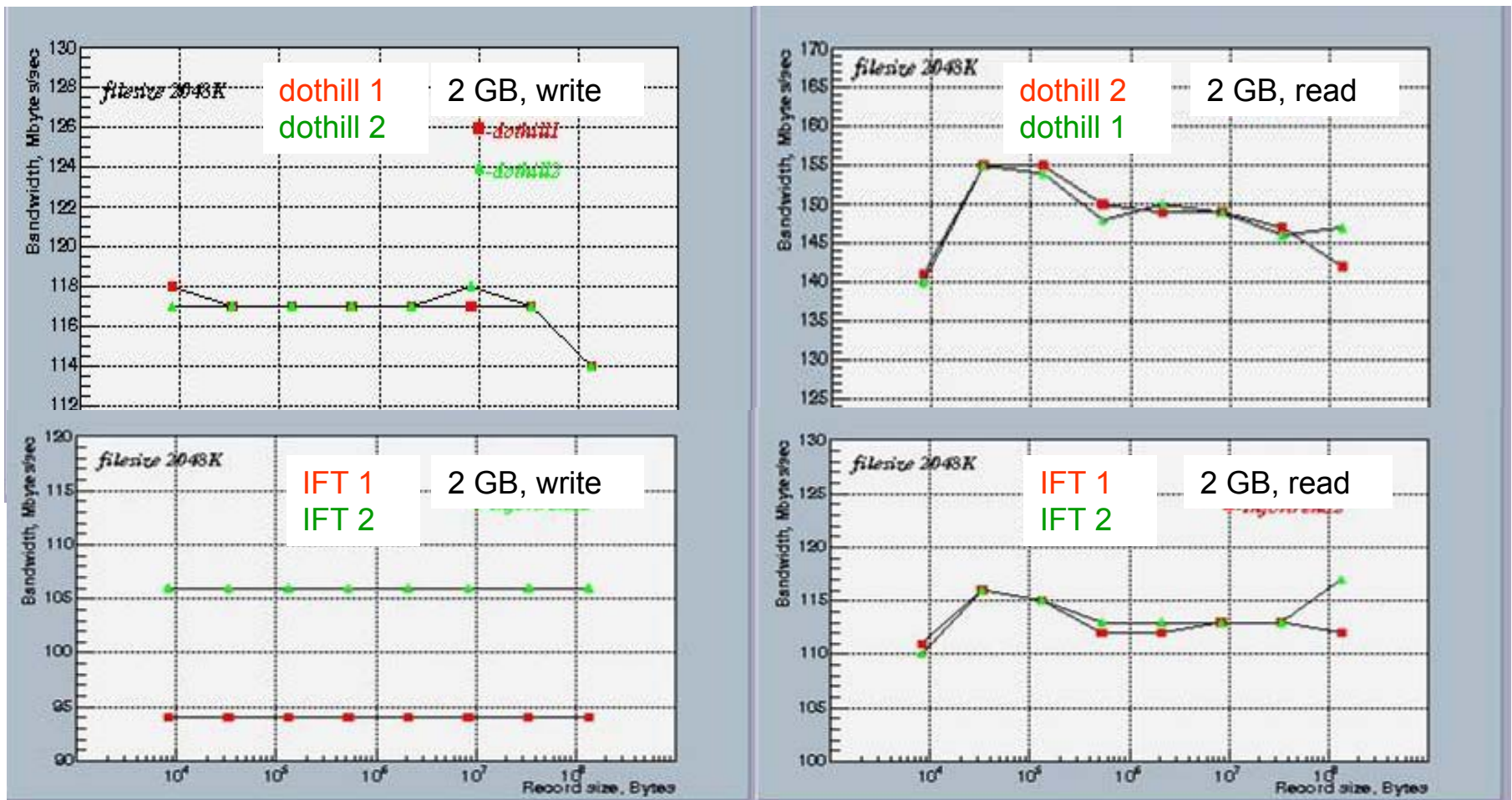
- 16 SATA drive slots
- 1GB cache
- 2 x 2Gbit fiber host channel





# Storage Arrays Performance

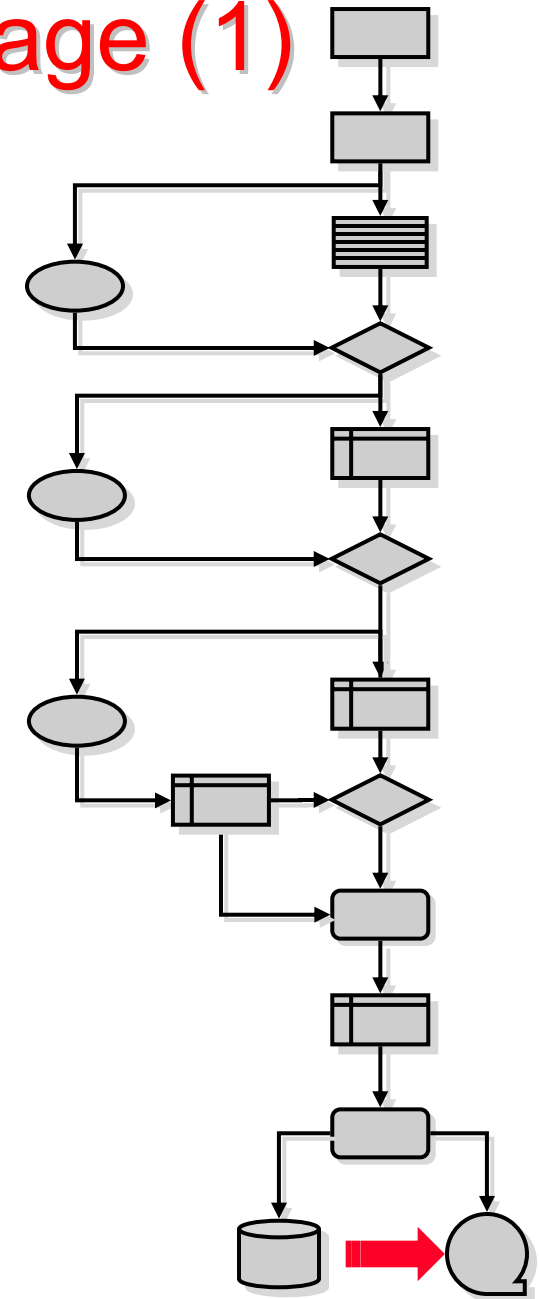
- Aggregate throughput measured for
  - Set of 5 disks configured as RAID 5
  - Filesizes of 100, 300, 1024 and **2048** MB
  - Recl=8 kB, 32 kB, 128 kB, 512 kB, 2 MB, 8 MB, 32 MB and 128 MB





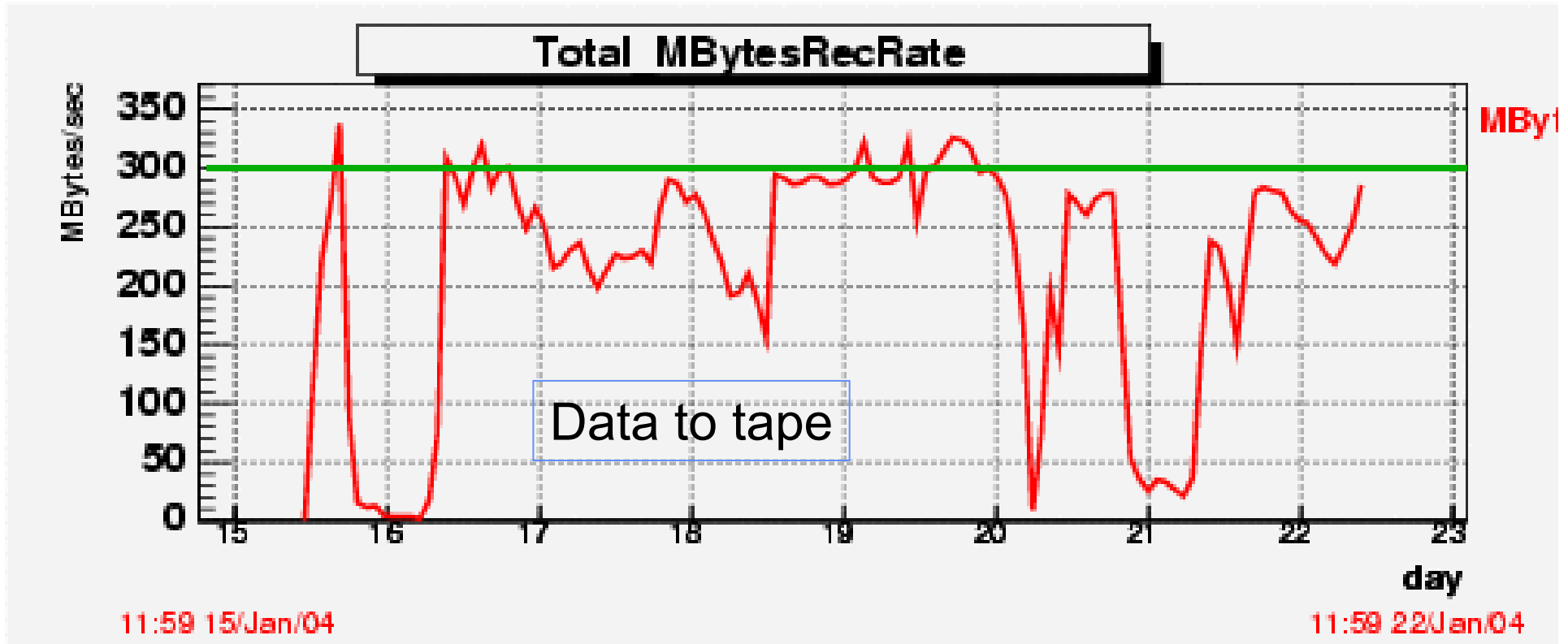
# Permanent Data Storage (1)

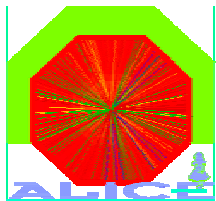
- ◆ Permanent data storage in the computing centre
- ◆ Baseline solution
  - Magnetic tape
- ◆ Critical areas
  - High Energy Physics peculiar use of tapes
  - Infrastructure hidden by a hierarchical storage management sw
  - Limited market, different application
  - Limited competition
  - No demonstrated alternative yet
- ◆ Demonstrated solution for LHC
  - 15 parallel streams





# Performance of Permanent Data Storage

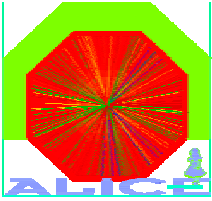




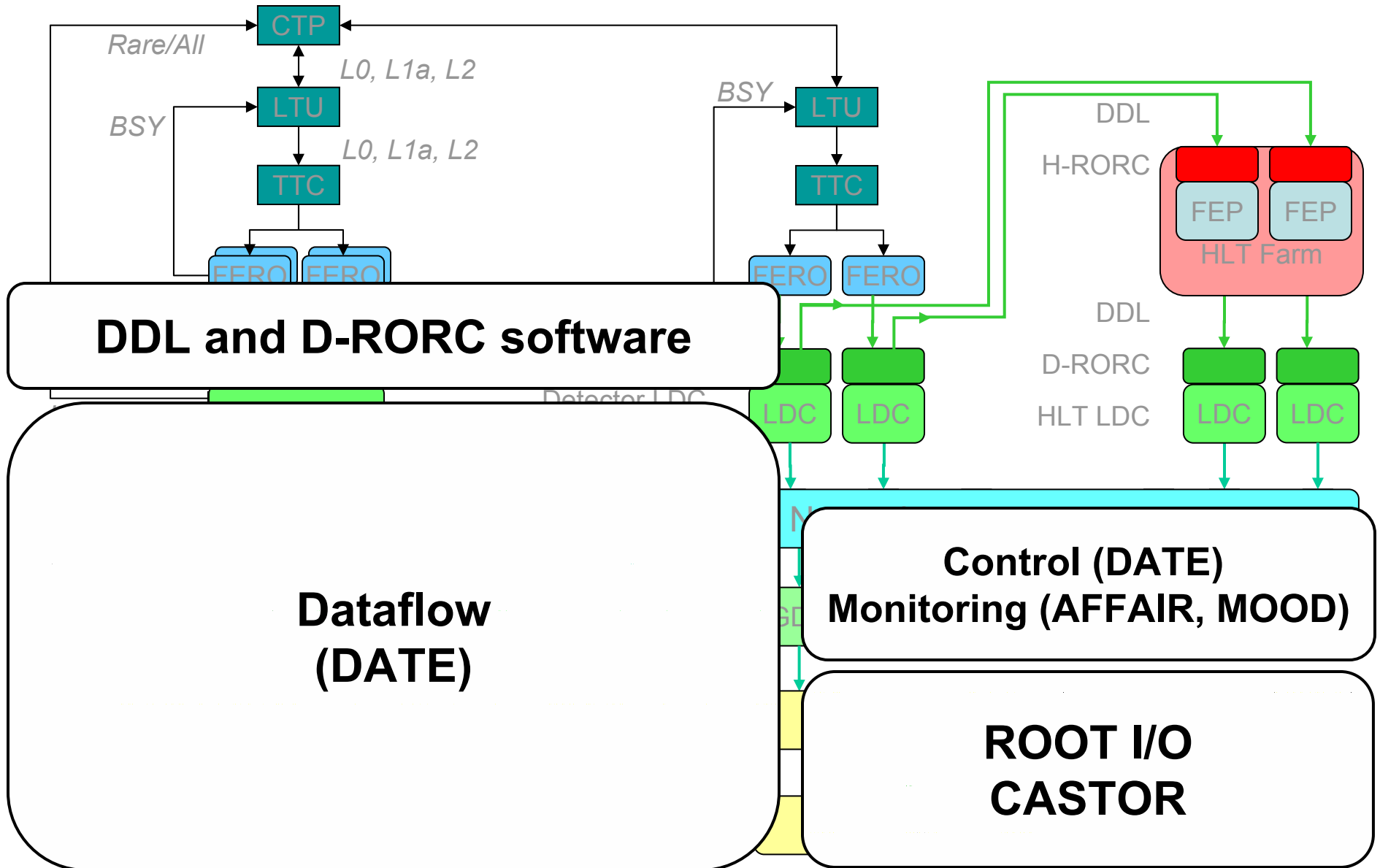
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# ALICE DAQ Software







# DAQ Software Framework

- ◆ DAQ Software Framework
  - Common interfaces for detector-dependant applications
  - Address all configurations and all development phases
  
- ◆ DAQ Software
  - Complete ALICE DAQ software framework in 3 packages:
    - **DATE:**
      - ◆ Data-flow: detector readout, event building
      - ◆ System configuration, control (1000's of programs to start, stop, synchronize)
    - **AFFAIR: Performance monitoring**
    - **MOOD: Data quality monitoring**
  - Production-quality releases
  - Evolving with requirements and technology ⇒ home-development
  
- ◆ Key issues
  - Scalability (1 to 1000, demonstrate it)
  - Support and documentation



# Data Flow - DATE

### DAQ - Run Control

DOMAIN: divia23073

**Configuration** | **Run Parameters** | **Ready to start** | **Data Taking**

Define | Show | Define | Show | Start run | Stop run | Run AutoStart | Autoselect GDC | Recording Enabled | AFFAIR | EDM | ALIMDC | HLT

RUN NUMBER : 1785    DAQ Logic Engine Status : RUNNING

Info: Run 1785 running

Trace: Fri 13 11:07 Run 1785 running  
Clear: Fri 13 11:07 Run number saved on /dateSiteAdc/configurationFiles/runNumber.config  
Fri 13 11:07 Starting run 1785  
Debug: Fri 13 11:07 \* Message from tbed0029gdc: TRACE STOP\_PROCESS: EVB 3223 has been killed as r  
Fri 13 11:07 \* Message from tbed0029gdc: ACTION End of run requested with error  
Pause: Fri 13 09:10 \* Message from tbed0049lhc: ERROR file /date/runControl/Linux/checkProc.sh problem  
Bigger: Fri 13 08:05 Run 1784 running  
Smaller: Fri 13 08:05 Run number saved on /dateSiteAdc/configurationFiles/runNumber.config

```
root@web0001:~#
```

11:21am up 78 days, 22:29, 1 user, load average: 1.73, 1.69, 1.62  
90 processes: 87 sleeping, 3 running, 0 zombie, 0 stopped  
CPU0 states: 2.0% user, 50.5% system, 1.2% nice, 46.1% idle  
CPU1 states: 3.0% user, 75.3% system, 2.0% nice, 21.0% idle  
Mem: 384356K av, 374564K used, 9792K free, 3020K shrd, 147540K buff  
Swap: 1044184K av, 26364K used, 1017820K free

PID	USER	PRI	NI	SIZE	RSS	SHARE	STAT	%CPU	%MEM	TIME	COMMAND
15208	nobody	14	5	4080	4080	3644	R N	99.9	1.0	13:09	recorder
1334	root	9	0	2332	2284	1592	S	0.5	0.5	21:39	sshd
1574	root	9	0	1060	1060	820	R	0.3	0.2	30:05	top
3	root	19	19	0	0	0	SWN	0.1	0.0	13:47	ksoftirqd_CPU0
1337	root	9	0	2368	2364	1856	R	0.1	0.6	3:17	xterm
5070	nobody	8	0	4004	3976	1468	S	0.1	1.0	10:00	reServer
1	root	9	0	496	448	448	S	0.0	0.1	0:12	init
2	root	8	0	0	0	0	SW	0.0	0.0	0:00	keventd
4	root	19	19	0	0	0	SWN	0.0	0.0	12:06	ksoftirqd_CPU1
5	root	9	0	0	0	0	SW	0.0	0.0	1:58	kswapd
6	root	9	0	0	0	0	SW	0.0	0.0	0:00	kreclaihd
7	root	9	0	0	0	0	SW	0.0	0.0	0:00	bdFlush
8	root	9	0	0	0	0	SW	0.0	0.0	0:01	kupdated
9	root	-1	-20	0	0	0	SW<	0.0	0.0	0:00	mdrecoveryd
15	root	9	0	0	0	0	SW	0.0	0.0	0:00	scsi_ah_0
16	root	9	0	0	0	0	SW	0.0	0.0	0:00	scsi_ah_1

### SD LDC status display

LDC name	tbed0001ldc	tbed0013ldc	tbed0030ldc	tbed0037ldc
Event rate	13	13	14	13
Bytes recorded rate	40.182 M	41.203 M	41.938 M	40.163 M
Bytes in buffer	C 1192% M 1195%	C 1188% M 1193%	C 1192% M 1194%	C 1187% M 1191%
Number of events	10453	10462	10457	10450
Events recorded	9816	9825	9820	9813
Bytes injected	31'031'205'136	31'057'922'896	31'043'079'696	31'022'299'216
Bytes recorded	29'141'863'284	29'175'752'364	29'154'396'136	29'140'480'912
Readout SOR/EOR phases	0	0	0	0
Recorder SOR/EOR phases	0	0	0	0

### GDC status display

GDC name	tbed0003gdc	tbed0004gdc	tbed0014gdc	tbed0015gdc
Events received	4924	5170	5438	3505
Events recorded	622	639	673	432
Bytes received	14'588'026'944	15'347'910'144	16'167'256'896	10'428'860'800
Bytes recorded	14'392'096'256	15'175'728'576	15'983'200'832	10'259'640'800
Event builder SOR/EOR phases	0	0	0	0
Status	FULL	FULL	FULL	

### EDM status display

EDM name	tbed0015edm
wakeUpld received	(nblnRun:10442)
maxWakeUpld	(nblnRun:10442)
lastThresholdSent	(nblnRun:10454)
lastUpperBoundSent	(nblnRun:10464)
edmMask	[0]:00040000 [1]:00000100
Excluded	3 4 14 26 29 41 50 51 64 65 74 75 96 97

```
11:21:11 root@web0001:~#
```

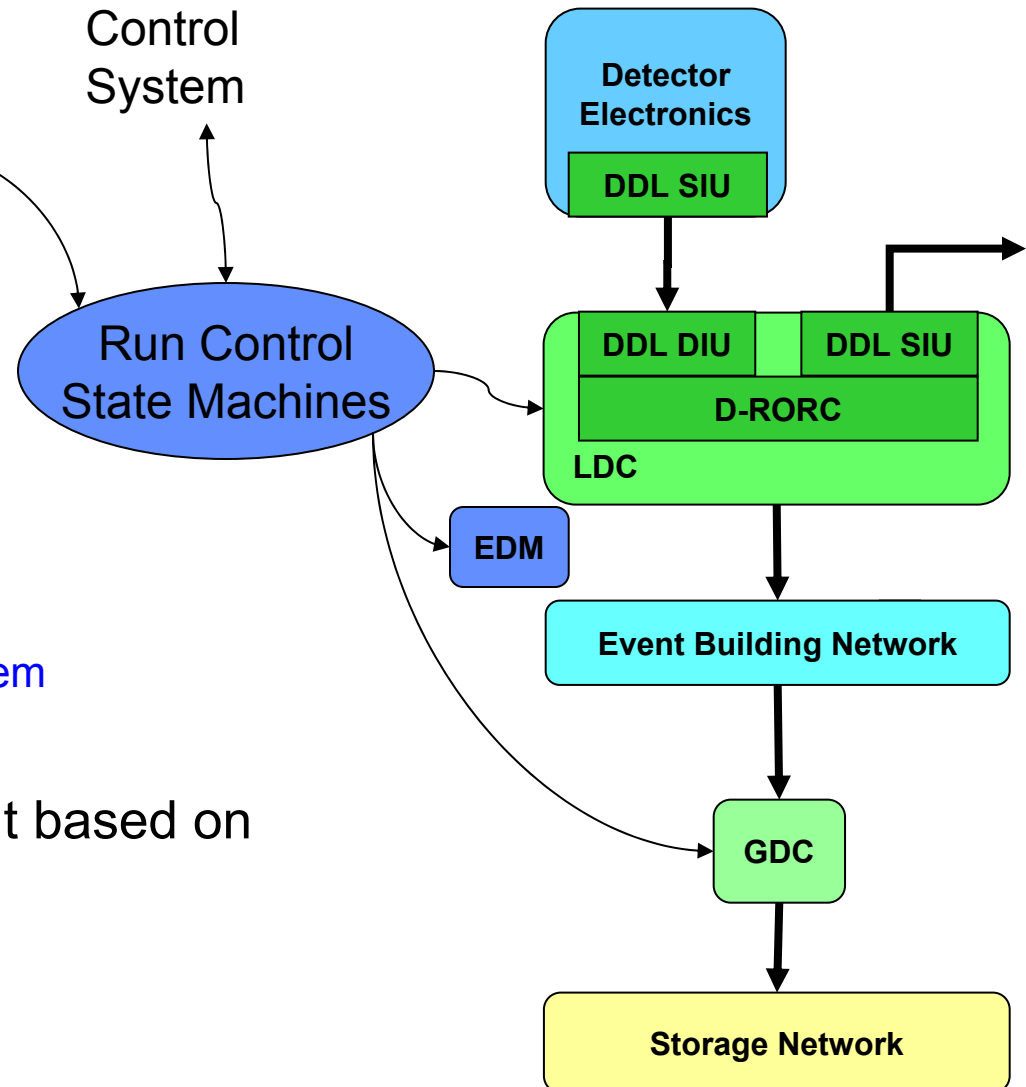
PID	USER	PRI	NI	SIZE	RSS	SHARE	STAT	%CPU	%MEM	TIME	COMMAND
31330	nobody	14	5	187M	187M	187M	R N	44.8	50.0	5:23	eventBuilder
31363	alicemdc	13	5	188M	188M	187M	S N	23.5	50.1	3:47	writeCastor_v3
28903	pvv	9	0	992	948	748	S	1.9	0.2	40:30	top
15701	root	14	0	1052	1052	820	R	1.7	0.2	1:56	top
3	root	19	19	0	0	0	RWN	0.7	0.0	21:16	ksoftirqd_CPU0
4131	root	9	0	2176	1724	1496	S	0.3	0.4	23:19	sshd
496	root	9	0	532	532	448	S	0.3	0.1	0:00	sleep
838	ntp	9	0	1924	1924	1732	S	0.1	0.5	0:14	ntpd
18454	root	9	0	1236	1080	964	S	0.1	0.2	0:05	xload
1	root	8	0	488	440	424	S	0.0	0.1	0:20	init
2	root	8	0	0	0	0	SW	0.0	0.0	0:00	keventd
4	root	19	19	0	0	0	RWN	0.0	0.0	21:13	ksoftirqd_CPU1
5	root	9	0	0	0	0	SW	0.0	0.0	1:38	kswapd
6	root	9	0	0	0	0	SW	0.0	0.0	0:00	kreclaihd
7	root	9	0	0	0	0	SW	0.0	0.0	0:00	bdFlush
8	root	9	0	0	0	0	SW	0.0	0.0	0:03	kupdated



# Control - DATE



Experiment  
Control  
System



- ◆ DATE software
  - Operator console
  - State machines
  - Control of distributed system
- ◆ Home-made development based on free software



# DATE Scalability in ADC V

ADV\_CTRLS::ALLDETECTORS\_CONTROL

**DAQ - Run Control**

HI running on tbed0001.cern.ch with PID 29758  
RC running on tbed0001.cern.ch

Disconnected Configuration | **Connected Run Parameters** | Ready to start | Data Taken

Start processes | Start | Stop | Abort

Recording Enabled | AFFAIR | HLT | GDC ON | ALIMDC | EDM

RUN NUMBER : 5443 Run Control Status : RUNNING

Trace  
Clear  
Debug  
Pause  
Bigger  
Smaller

```

Tue 26 15:42:46 (RC) Run number saved on /dateSiteAdc/configurationFiles/ALLDETECTORS/run
Tue 26 15:42:45 (HI) Run Options loaded from : /dateSiteAdc/configurationFiles/ALLDETECTORS
Tue 26 15:42:45 (HI) Start processes time : 32 seconds
Tue 26 15:42:13 (RC) Starting run 5443
Tue 26 15:42:13 (RC) Run Options loaded from : /dateSiteAdc/configurationFiles/ALLDETECTORS
Tue 26 15:42:13 (HI) RC options saved as : /dateSiteAdc/configurationFiles/ALLDETECTORS/AD
Tue 26 15:41:58 (RC) Connected to remote hosts
Tue 26 15:41:58 (HI) Connection time 34 seconds
Tue 26 15:41:29 (RC) Starting Logic Engines at 26 Aug 2003 15:41:28 (Wait...)
Tue 26 15:41:24 (RC) Connecting to tbed0082ldc
Tue 26 15:41:24 (RC) Connecting to tbed0081ldc
Tue 26 15:41:24 (RC) Connecting to tbed0080ldc
Tue 26 15:41:24 (RC) Connecting to tbed0079ldc
Tue 26 15:41:24 (RC) Connecting to tbed0078ldc
Tue 26 15:41:24 (RC) Connecting to tbed0077ldc
Tue 26 15:41:24 (RC) Connecting to tbed0076ldc
Tue 26 15:41:24 (RC) Connecting to tbed0075ldc
Tue 26 15:41:24 (RC) Connecting to tbed0074ldc
Tue 26 15:41:24 (RC) Connecting to tbed0073ldc
Tue 26 15:41:24 (RC) Connecting to tbed0072ldc
Tue 26 15:41:24 (RC) Connecting to tbed0071ldc
Tue 26 15:41:24 (RC) Connecting to tbed0070ldc
Tue 26 15:41:24 (RC) Connecting to tbed0069ldc
Tue 26 15:41:24 (RC) Connecting to tbed0068ldc
Tue 26 15:41:24 (RC) Connecting to tbed0067ldc
Tue 26 15:41:24 (RC) Connecting to tbed0066ldc
Tue 26 15:41:24 (RC) Connecting to tbed0065ldc
Tue 26 15:41:24 (RC) Connecting to tbed0064ldc
Tue 26 15:41:24 (RC) Connecting to tbed0063ldc
Tue 26 15:41:24 (RC) Connecting to tbed0062ldc
                    
```

SMI Status

**GDC (91)**

NOT RUNNING  
STARTING  
STARTING ALIMDC  
STARTING EVB  
RUNNING  
RUNNING\_ERR  
STOPPING\_EV  
STOPPING ALIMDC  
WAIT\_STOPPED  
STOPPED

**LDC (71)**

NOT RUNNING  
SYNCHRONOUS  
STARTING  
STARTING\_EDMC  
STARTING\_RECORDER  
STARTING\_HLTAGENT  
STARTING\_EDMAGENT  
STARTING\_READOUT  
RUNNING  
STOPPING\_READOUT  
STOPPING\_EDMAGENT  
STOPPING\_HLTAGENT  
STOPPING\_RECORDER  
STOPPING\_EDMC  
STOPPED

SD

**LDC status display**

LDC name	tbed0001ldc	tbed0002ldc	tbed0003ldc	tbed0004ldc
Event rate	377	311	297	330
Bytes recorded rate	38.453 M	31.852 M	30.443 M	33.814 M
Bytes in buffer	C 40% M 40% 638	C 39% M 39% 623	C 39% M 39% 620	C 40% M 40% 6
Number of events	8645	7761	7580	8533
Events recorded	8008	7126	6944	7896
Bytes injected	886056720	795453792	776902740	874577616
Bytes recorded	822185216	733107796	714808848	811135200
Readout SOR/EOR phases	0	0	0	0
Recorder SOR/EOR phases	0	0	0	0

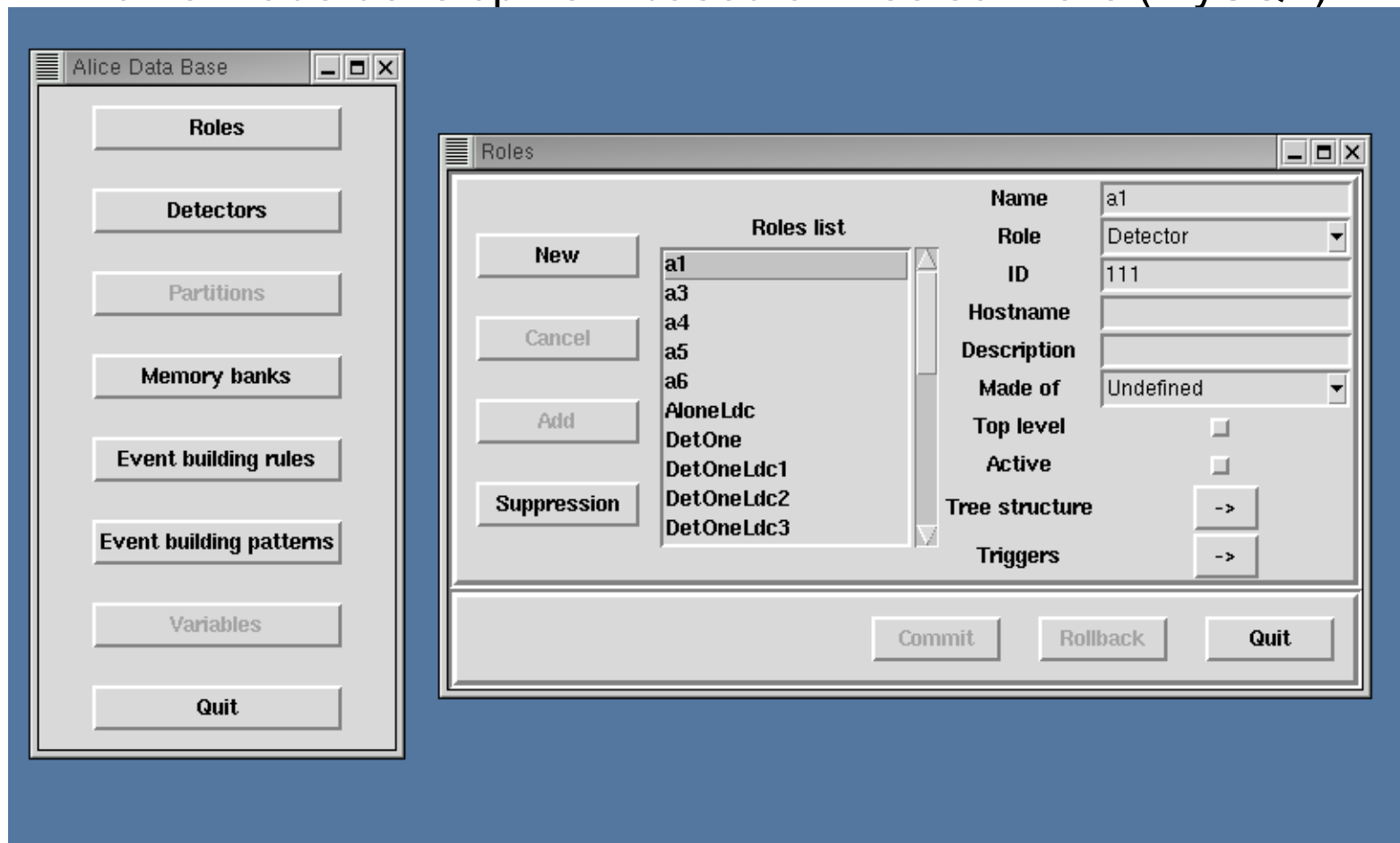
**GDC status display**

GDC name	tbed0001gdc	tbed0002gdc	tbed0003gdc	tbed0004gdc
Events received	5007	4872	4726	4658
Events recorded	145	3	2	2
Bytes received	563359168	580661364	542728828	533713160
Bytes recorded	65782276	64823208	43215472	43215472
Event builder SOR/EOR phases	0	0	0	0
Status				



# DAQ Configuration Database

- ◆ DATE Configuration Database
  - Operator console
  - State machines
- ◆ Home-made development based on free software (MySQL)





# Web access to Configuration Database

Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://localhost/date/dumpconfig.php>

Home Bookmarks

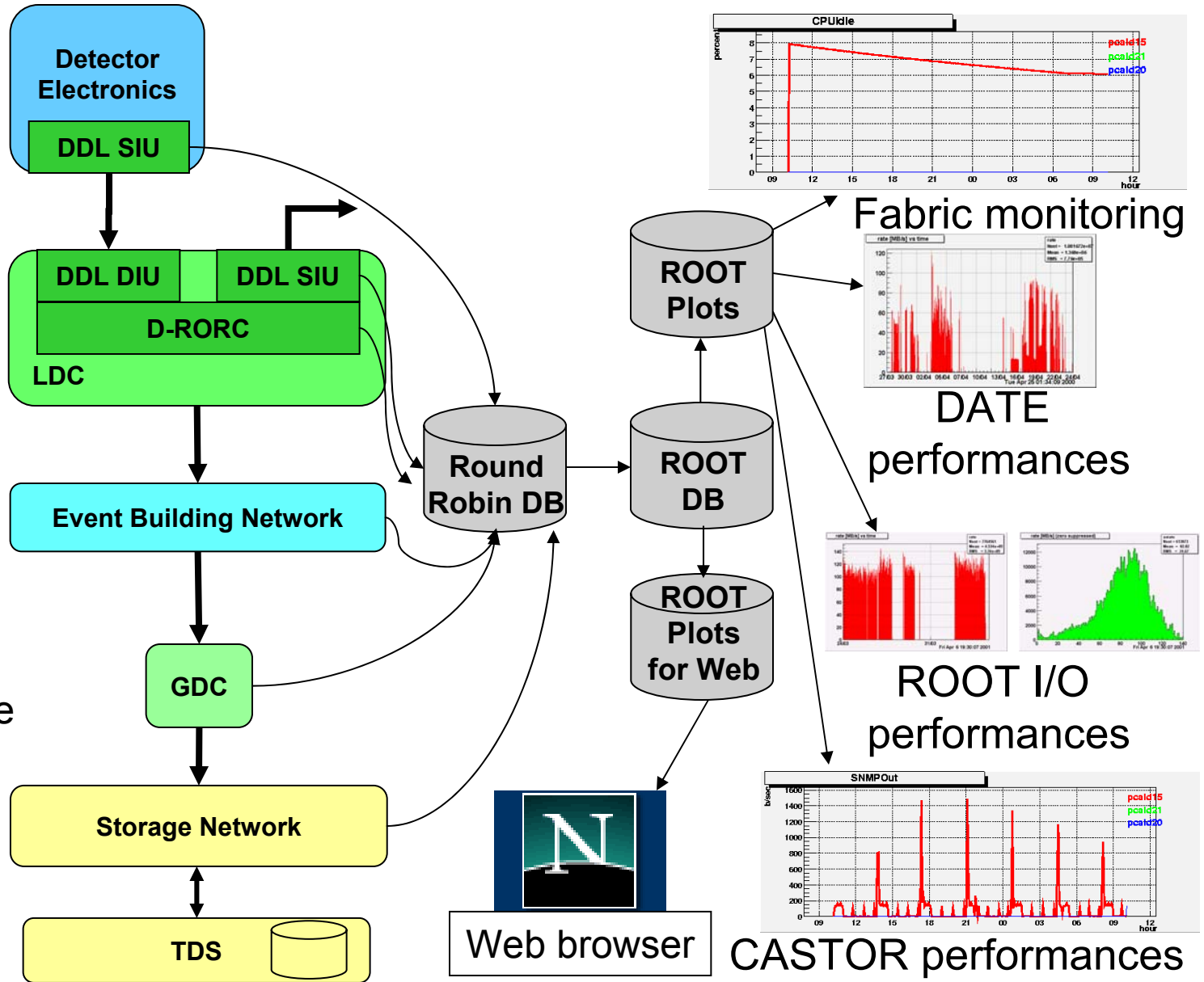
Connected successfully to DATE database

## Roles

Name	Hostname	Description	Role	Id	Toplevel	Madeof	
gdc1	host8	GDC #1	GDC	1	1	1	Undefined
gdc2	host9	GDC #2	GDC	2	1	1	Undefined
DetOneLdc1	host1	DetOne LDC #1	LDC	1	0	1	Undefined
DetOneLdc2	host2	DetOne LDC #2	LDC	2	0	1	Undefined
DetOneLdc3	host3	DetOne LDC #3	LDC	3	0	1	Undefined
DetTwoLdc1	pcald37	DetTwo LDC #1	LDC	10	0	1	Undefined
DetTwoLdc2	host5	DetTwo LDC #2	LDC	11	0	1	Undefined
AloneLdc	host7	Single LDC	LDC	30	1	1	Undefined
DetThreeLdc	host6	DetThree LDC	LDC	160	0	1	Undefined
DetOne		Detector 1	Detector	1	1	1	Subdetector
DetTwo		Detector 2	Detector	2	1	1	LDC



# Performance Monitoring - AFFAIR

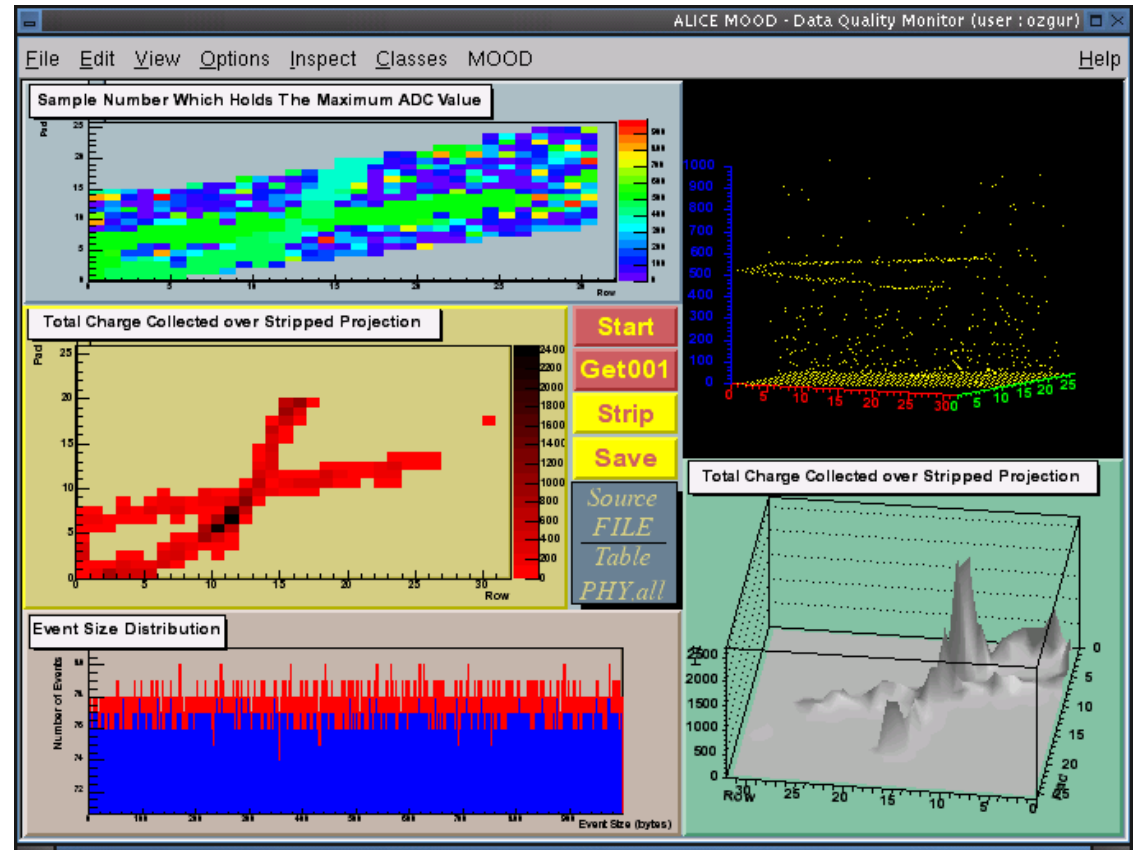


- ◆ Home-made development
- ◆ Based on free software



# Data quality monitoring - MOOD

- ◆ MOOD framework
  - Interfaces to detector code
  - Software development in all institutes
- ◆ Applications:
  - Raw data integrity
  - Detector performance

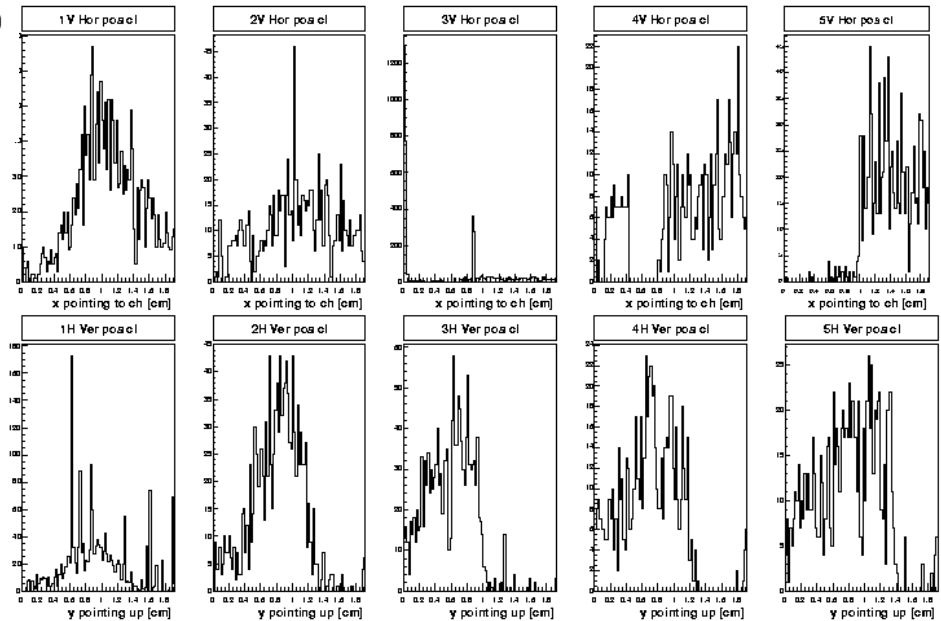
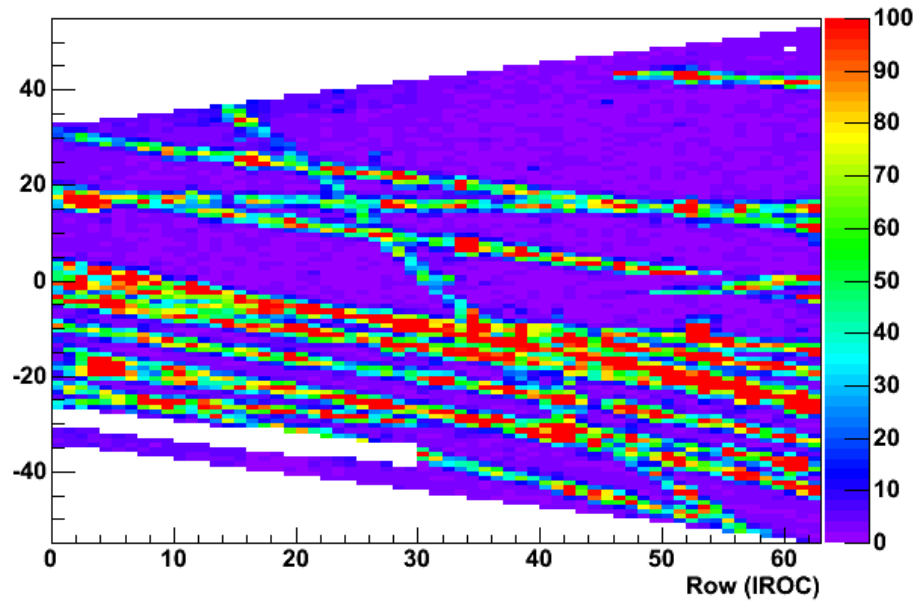


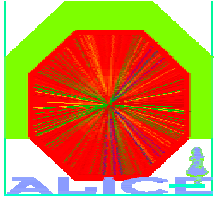




# Data quality monitoring - MOOD

Event: "377" Timebin: 0-1000



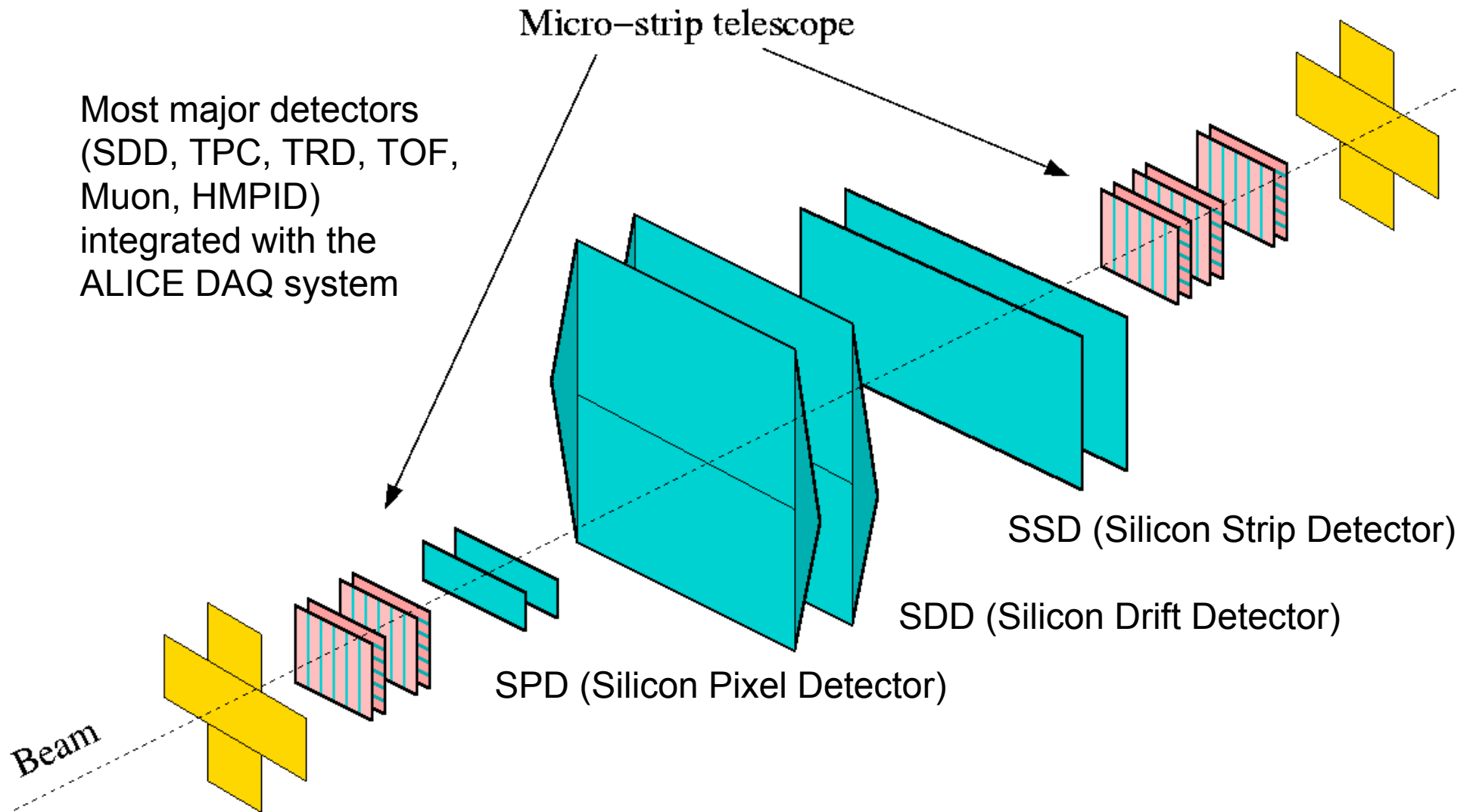


# Outline

- ALICE DAQ
  - Trigger/DAQ logical model - Requirements
  - Trigger/DAQ at LHC
  - ALICE Trigger/DAQ Architecture
- Hardware components
- Software packages
- Towards the final ALICE
- Conclusions

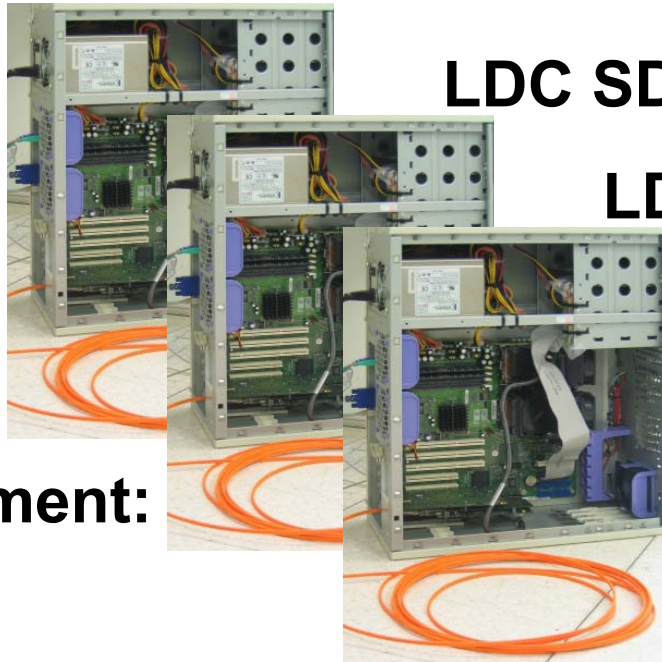


# Combined ITS test beam





# DAQ for ITS Test Beam



**LDC SDD**

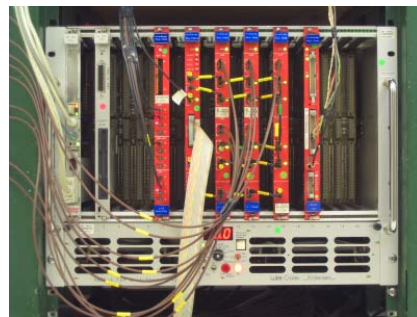
**LDC SPD**

**1 equipment:**  
•RORC

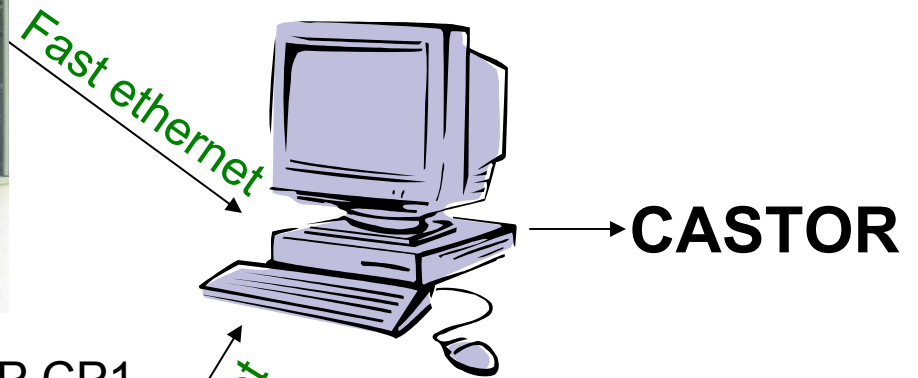
**GDC:**

Seil 2 Xeon 2.4 GHz 1GB  
RH linux 7.3.2 – DATE 4.6

**LDC VME:** CCT VP CP1  
RH linux 7.3.2 – DATE 4.6



**3 equipments:**  
•Trigger (HW/SW)  
•Microstrip readout  
•TDC




- Event builder
- Run control
- Monitoring
- NFS server



# Control for ITS Test Beam

File View Options Permissions

## ITS Partition Control Agent



PCA More ...

Waiting for commands

FERO READY: TRUE More ...

Access rights granted to the PCA

DCS ... DAQ ... TRIGGER ...

PCA info: 16:16:19 : {}

File

## ITS Individual Detectors operations

SDD SPD SSD

Waiting for commands STANDALONE\_RUN Waiting for commands

File Permissions

## ITS TRG details

TPA LTU-SDD LTU-SPD LTU-SSD

STOPPED STANDALONE\_STOPPED START E\_STOPPED STANDALONE\_STOPPED



# Simulation

- ◆ Complete model of the ALICE TRG/DAQ
- ◆ See next 2 talks:
  - Tome Anticic  
ALICE Trigger and DAQ – Simulation
  - Linda Vickovic  
ALICE Mass Storage System Simulation



# Conclusions

- ◆ ALICE TRG DAQ system
  - All major hw and sw components released
  - Production phase
- ◆ Towards the final system
  - Integrated with most major detectors
  - First combined test beam
  - Simulation
- ◆ System evolution
  - New technology: PCI-XP, multicore CPU, 10 Gbit Eth
  - Isolate from technology obsolescence by logical interfaces (DDL or Mass Storage System)
- ◆ Start installation 1Q 2005. Startup 1Q 2007