Event-Builder Upgrade & Level-3 PC Farm Maintenance

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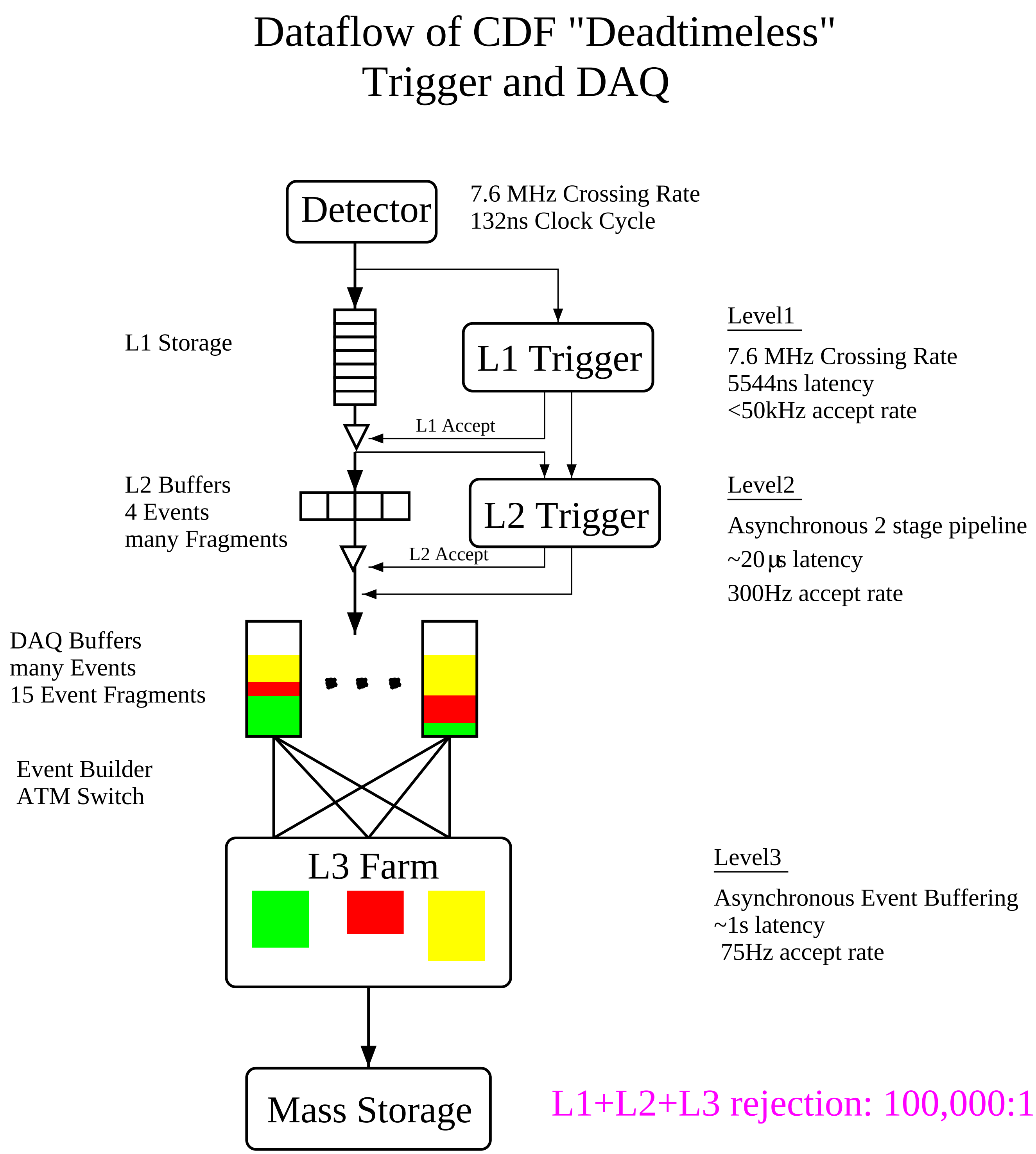
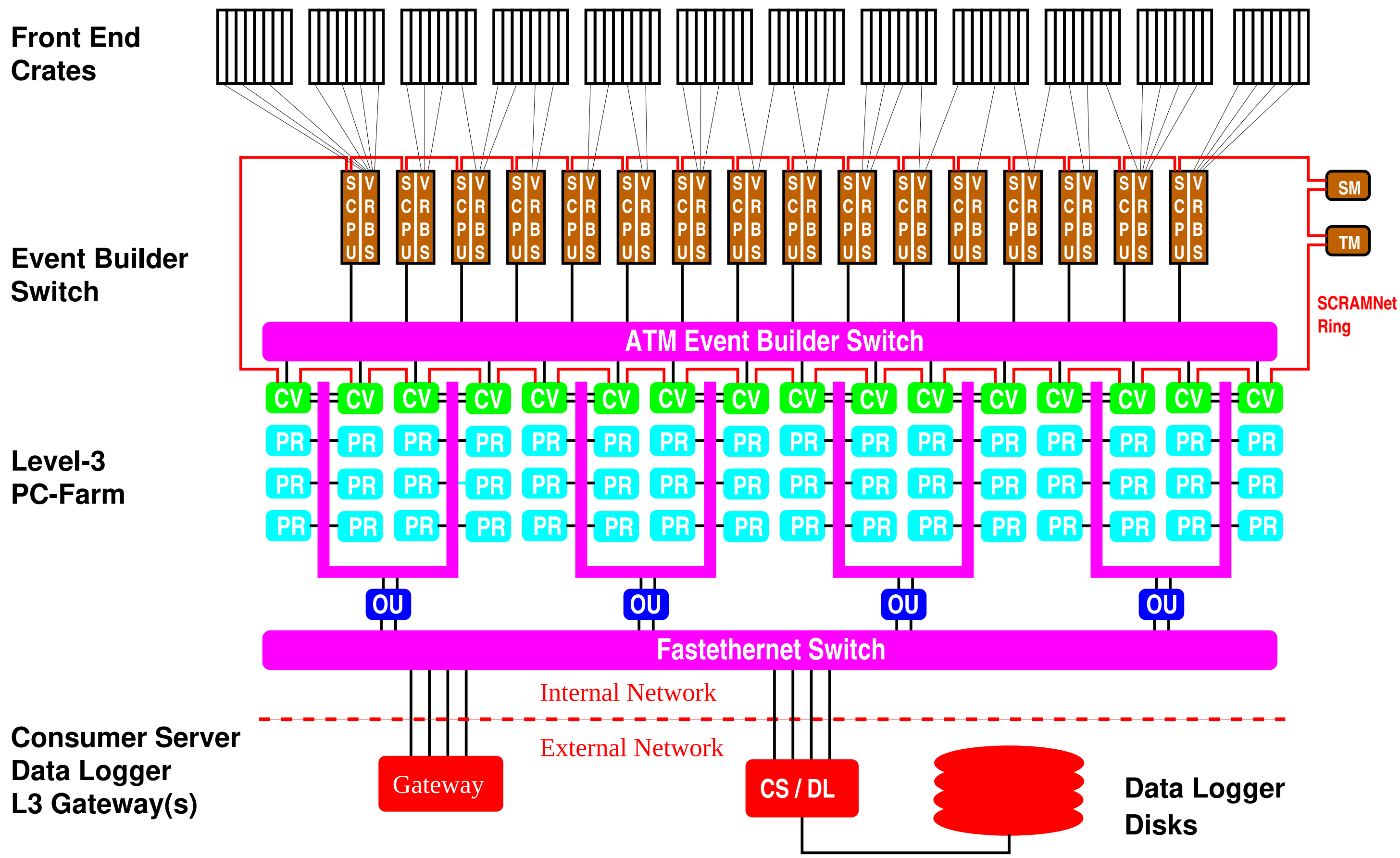
CDF Trigger and DAQ Overview



Event Builder & L3 farm Overview



Event Builder & Level 3 Specs

	Run2a Design	Present Perf.	Run 2b Upgrade
Max. Level-2 rate	300 Hz	300-500 Hz	1000 Hz
Mean Event Size	150 kB	250 kB	250 kB
Input Rate	44 MB/s	70-120 MB/s	244 MB/s
Max. Level-3 Output	75 Hz	75 Hz	
Max. Level-3 Output	12 MB/s	20 MB/s	20 MB/s
CPU time per event	< 1s	~ 1s	~ 0.5s
# of processors in L3	288	540	540
# of proc. nodes in L3	144	270	270

EVB Performance Limits

$$\text{Max L3 input rate} = \frac{\text{ATM link bandwidth}}{\langle\text{event size}\rangle/\#\text{ of SCPUs}}$$

16MB/s link, 15 SCPUs, 250kB evts

$\Rightarrow \sim 1000$**Hz theoretical limit.**

Practical Limitations

- Non-uniformity of data volume among crates.
- fluctuations of data volume.
- limitations in other parts of DAQ.
- protocol overheads, latencies in SCRAMNet, ...

$\Rightarrow\ 300 - 500$**Hz sustained so far.**

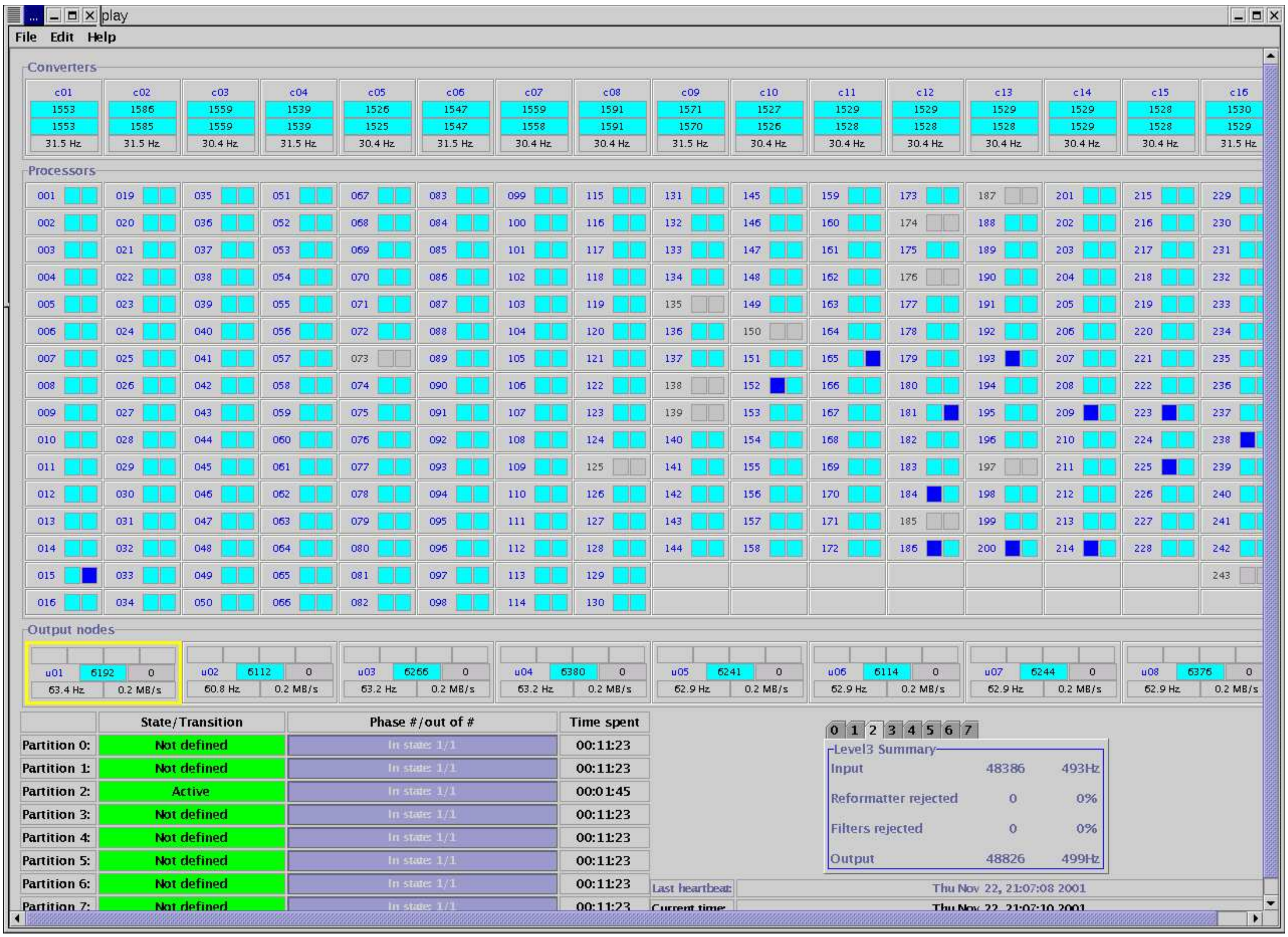
Proposed EVB Upgrade

16MB/s link ⇒ 64MB/s link

- 32 port ASX 4000 from Marconi
- 15 OC-12 PMC cards (e.g. Cyclone PMC59) (+spares)
- 16 OC-12 PCI cards (e.g. ForeRunnerHE 622) (+spares)
- Linux & VxWorks ATM driver development: 2 FTE years
- SCRAMNet message passing protocol 1/2 FTE years

All system software remains the same except low level drivers !!!

Level3 Farm


play
File Edit Help
Converters
c01 1553 1553 31.5 Hz
c02 1586 1585 31.5 Hz
c03 1559 1559 30.4 Hz
c04 1539 1539 31.5 Hz
c05 1526 1525 30.4 Hz
c06 1547 1547 31.5 Hz
c07 1559 1558 30.4 Hz
c08 1591 1591 30.4 Hz
c09 1571 1570 31.5 Hz
c10 1527 1526 30.4 Hz
c11 1529 1528 30.4 Hz
c12 1529 1528 30.4 Hz
c13 1529 1528 30.4 Hz
c14 1529 1529 30.4 Hz
c15 1528 1528 30.4 Hz
c16 1530 1529 31.5 Hz
Processors
Output nodes
u01 6192 0 63.4 Hz 0.2 MB/s
u02 6112 0 60.8 Hz 0.2 MB/s
u03 6265 0 63.2 Hz 0.2 MB/s
u04 6380 0 63.2 Hz 0.2 MB/s
u05 6241 0 62.9 Hz 0.2 MB/s
u06 6114 0 62.9 Hz 0.2 MB/s
u07 6244 0 62.9 Hz 0.2 MB/s
u08 6376 0 62.9 Hz 0.2 MB/s
State/Transition
Phase #/out of #
Time spent
Partition 0: Not defined In state: 1/1 00:11:23
Partition 1: Not defined In state: 1/1 00:11:23
Partition 2: Active In state: 1/1 00:01:45
Partition 3: Not defined In state: 1/1 00:11:23
Partition 4: Not defined In state: 1/1 00:11:23
Partition 5: Not defined In state: 1/1 00:11:23
Partition 6: Not defined In state: 1/1 00:11:23
Partition 7: Not defined In state: 1/1 00:11:23
0 1 2 3 4 5 6 7
Level3 Summary
Input 48386 493Hz
Reformatter rejected 0 0%
Filters rejected 0 0%
Output 48826 499Hz
Last heartbeat: Thu Nov 22, 21:07:08 2001
Current time: Thu Nov 22, 21:07:10 2001

L3 farm purchases

Farm purchases were staged to match needs and maximize total CPU power when physics quality data taking starts !!!

- 1998: 20 nodes
- 1999: +30 nodes
- 2000: +100 nodes
- 2001: +120 nodes = 270 nodes, all Duals

Will need to replace old nodes !!!

Summary & Conclusions

Event Builder Upgrade

- The existing EVB is very likely to fall short of Run2b needs by up to a factor of 2.
- The least time consuming upgrade provides a factor 3-4 increase in bandwidth at a cost of $ 500k.

Level3 Farm Maintenance

- The existing L3 farm was built up over the last 3 years.
- By 2007 our oldest PC's would be 9 years old !!!
- One should expect operational costs (i.e. replacing aging PC's) at the level of $ 500k over the course of the next 8 years.