



ALICE Computing Model

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GDB



Timeline

- December 9-10: Computing Model Workshop at CERN
- December 14: Presentation to the MB
- December (15) 17: the draft computing model and the projected needs are presented to the LHCC review committee
- January 17-19 LHCC review with sessions devoted to each of the experiments and a close-out session
 - Monday, 17 January : ATLAS (a.m.), CMS (p.m.)
 - Tuesday, 18 January: ALICE (a.m.) LHCb (p.m.)
 - Wednesday, 19 January: Closed Session (a.m.)





ALICE Computing TDR's

- ALICE Computing TDR
 - Early draft given to LHCC on December (15)17
 - Draft presented and distributed to the Collaboration during the ALICE/offline week in February
 - Final discussion and approval during the ALICE/offline week beginning of June



December 15, 2004

GDB Meeting

3





Computing MoU

- Distributed to the Collaboration management to obtain feedback on October 1
- We plan to distribute once more to get final feedback





Assumptions

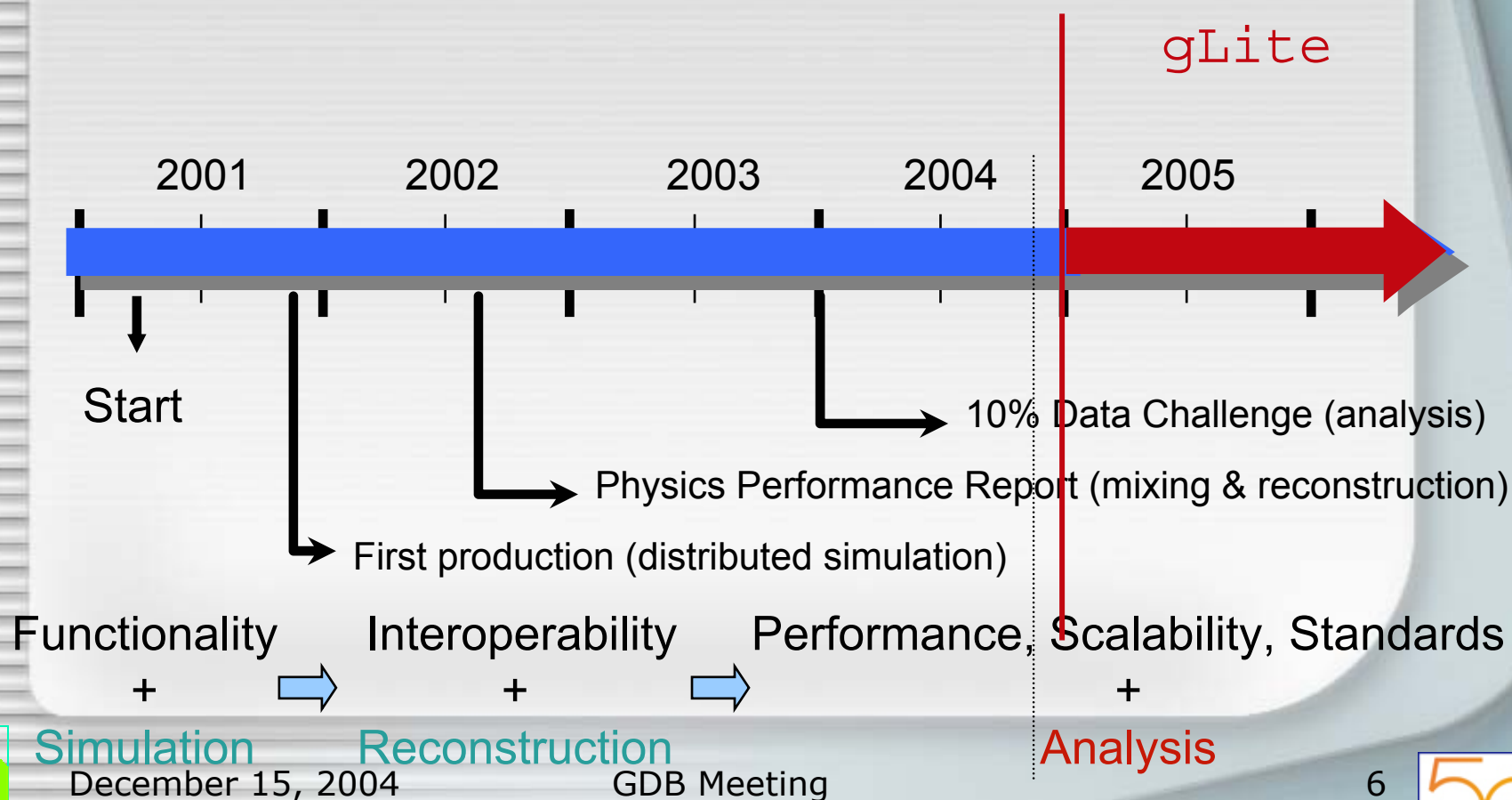
- We assume that there will be an operational Grid
 - This is a bold assumption
 - Technically possible, could be politically not feasible
- If not, we will still analyse the data (!), but
 - Less efficiency -> more computers -> more money
 - More people for production -> more money
- *Cloud model*
 - T0: first reconstruction pass, one copy of RAW
 - T1: subsequent reconstruction, one copy of RAW, one copy of all data to be kept, simulation and analysis
 - T2: simulation and analysis
- T1 & T2 keep active data on disk



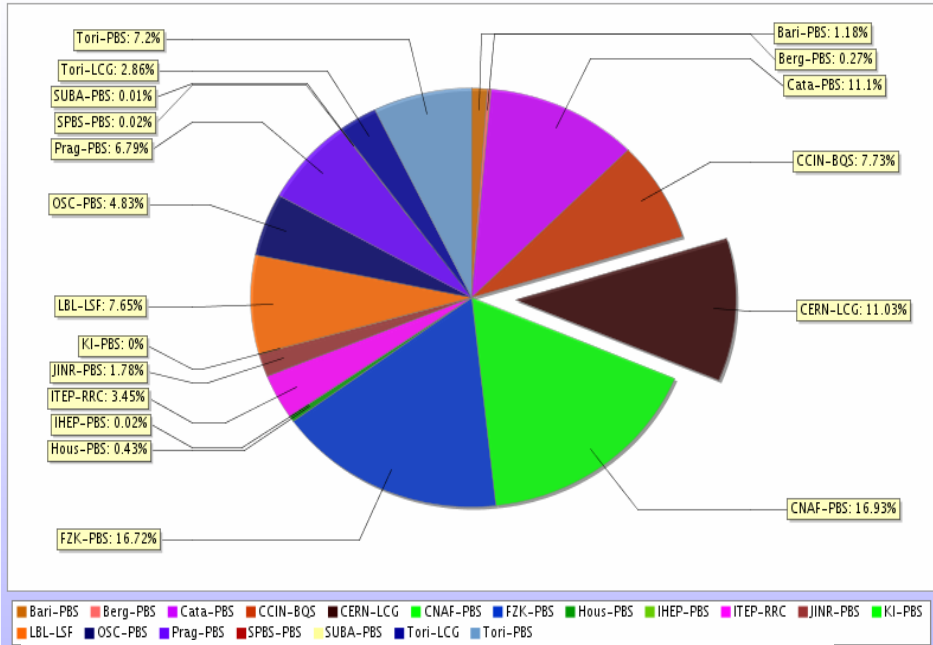


The ALICE Grid (AliEn->gLite)

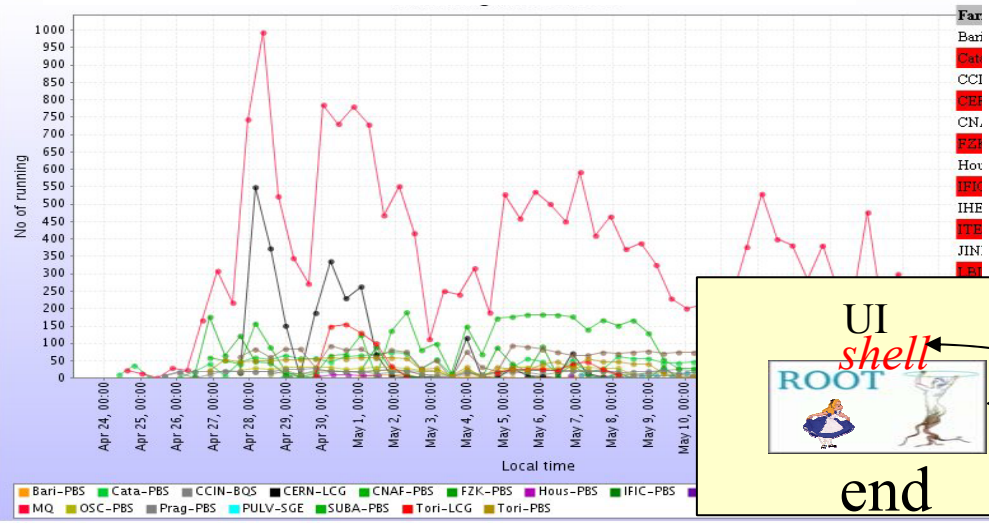
- Field tested and hardened in the Data Challenges
- Now one of the main inputs into the EGEE middleware



Phase 1+2 relative computing centres contribution



QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

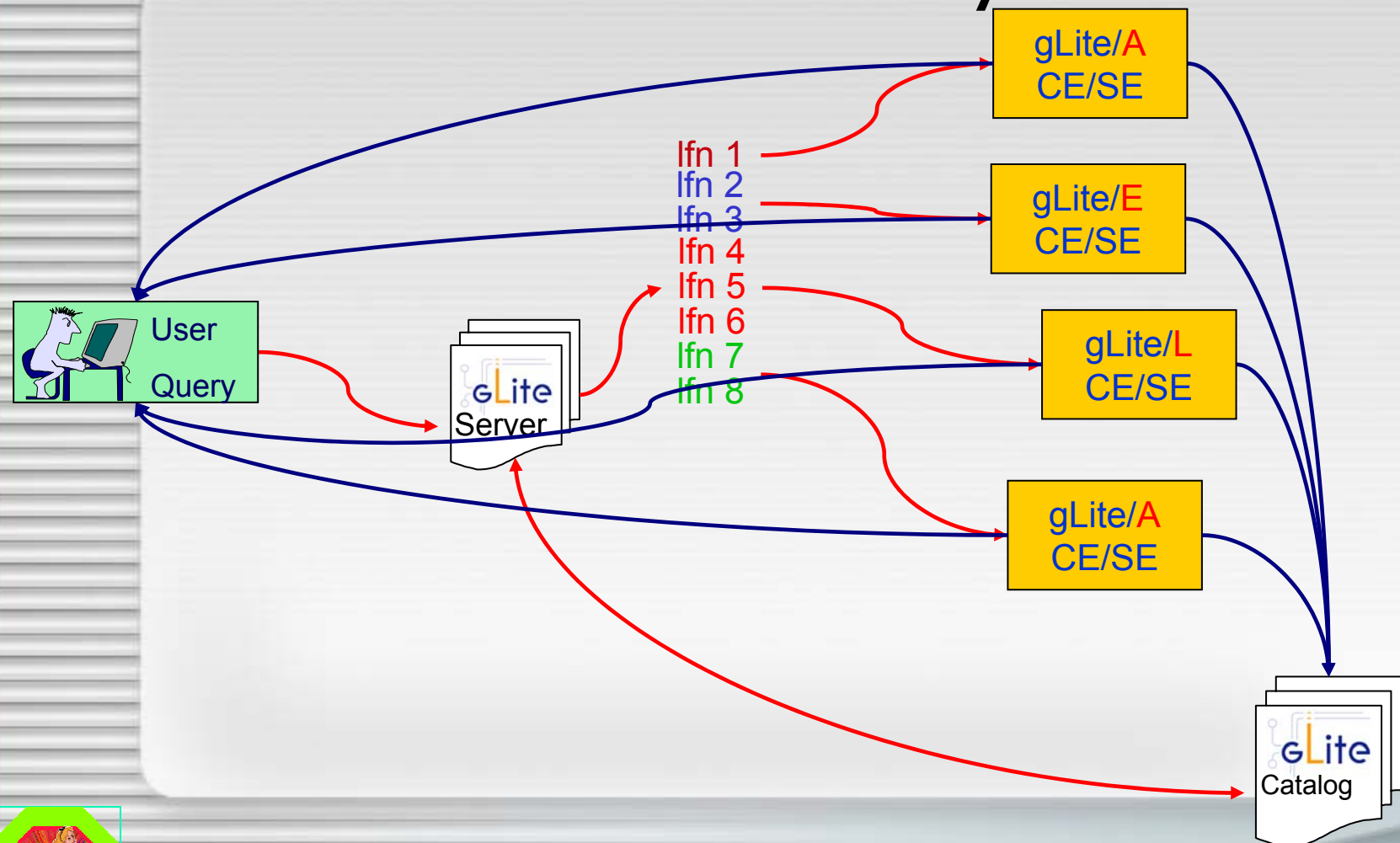


QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.





New phase III - Layout



- lfn 1
- lfn 2
- lfn 3
- lfn 4
- lfn 5
- lfn 6
- lfn 7
- lfn 8





Assumptions

- We of course assume the latest schedule for LHC
 - 07 100d pp $5 \times 10^6 \text{s} @ 5 \times 10^{32}$
 - 08 200d pp $10^7 \text{s} @ 2 \times 10^{33}$ 20d HI 10^6s
 - 09 200d pp $10^7 \text{s} @ 2 \times 10^{33}$ 20d HI 10^6s
 - 10 200d pp $10^7 \text{s} @ 10^{34}$ 20d HI 10^6s
 - We have rescheduled the 100% of the reosources for the beginning 2009 rather than the end 2008
 - We are now requesting 40% in 2008
- This should reduce the cost (-40%/y)
- We assume 3 reconstruction passes
 - But reality may be different





Data format

- RAW
 - Lightweight root format tested in data challenges
 - No streaming (may not be final decision)
- Reconstruction produces ESD (stored at T1's)
- ESD are then filtered in AOD's, several streams for different analysis
- MC data are larger due to debugging information embedded
- Data are replicated and moved around by the Grid
 - Average replication factor is 2





Processing strategy

- For pp similar to the other experiments
 - Quasi-online reconstruction first pass at T0, second pass at T1's, third pass at T0
 - Quasi-online data distribution
- For AA different model
 - First reconstruction three months after AA run, during shutdown, second and third pass distributed at T1's
 - Problem to "reread" from tape data being considered
 - Distribution of AA data over shutdown
- We assume a Grid that can optimise the workload





T0 complex

- Acquire and store RAW data
- Perform first pass reconstruction
 - AA in three months during shutdown
 - pp quasi online
- Perform calibration
 - pp quasi online, AA during shutdown
- Run second pass reconstruction for pp





T1

- Store a copy of all data to be saved and one copy of raw data
- Perform second and third pass reconstruction for pp
- Perform second pass reconstruction for AA
- Receive MC data from T2's
- Perform analysis and simulation *opportunistically*





T2

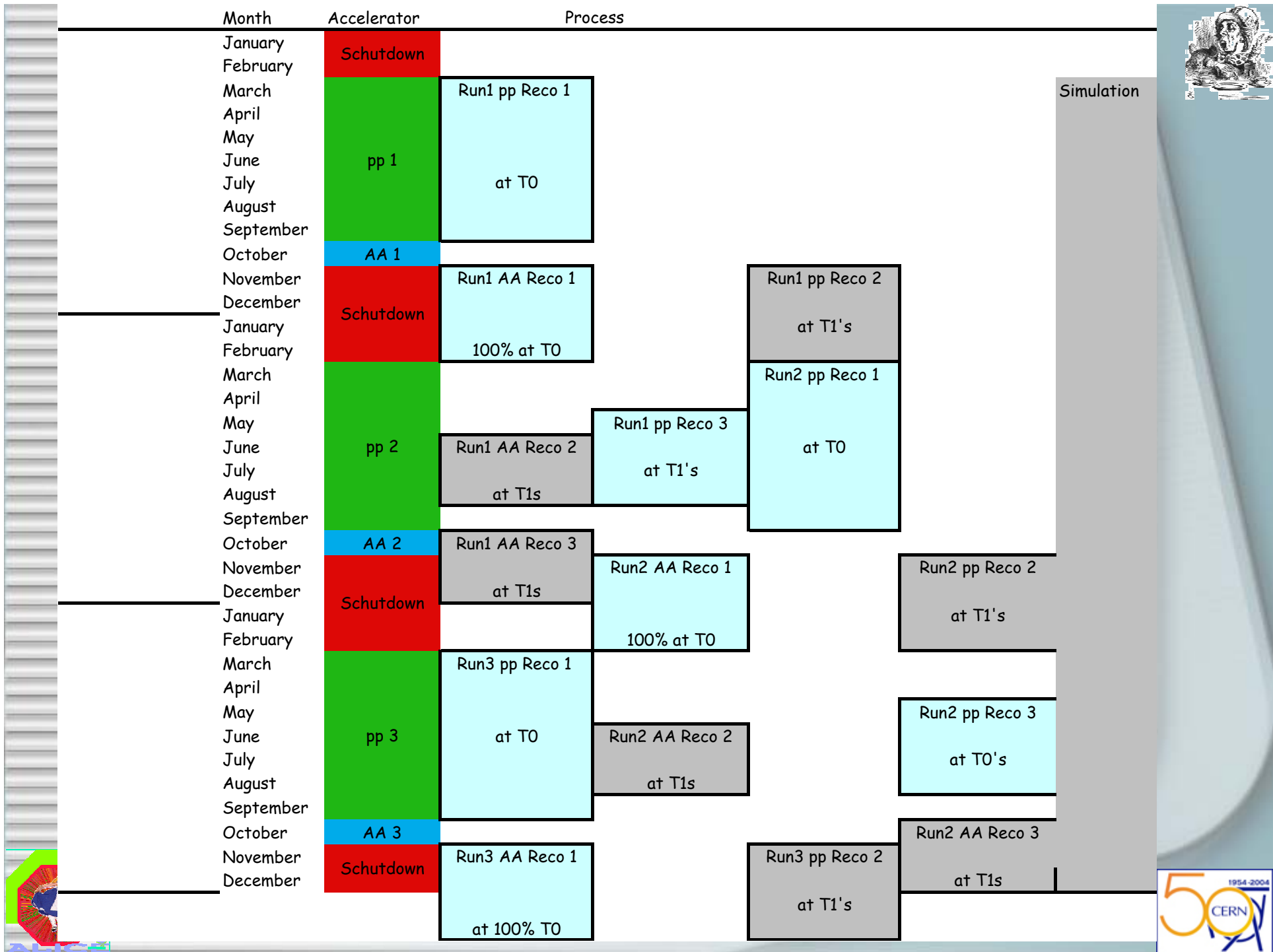
- Perform analysis and simulation
- Store data at T1's





Parameters for the ALICE Computing model					
	Name		Unit	Value	
				pp	PbPb
		# T1		7	
		# T2		19 (assumed)	
Real Data	Events	recording rate	Hz	100	100
		Raw size	MB	1.00	12.50
		ESD	MB	0.04	2.50
		AOD	MB	0.010	0.250
		Event catalog	MB	0.003	0.010
	Statistics	Running time per year	s	1.E+07	1.E+06
		Shutdown period	s	1.E+07	
		Evts/year		1.E+09	1.E+08
	Reconstruction	# reconstruction passes per year		3	3
		RAW duplication factor		2	2
ESD duplication factor			2.0	2.0	
Analysis passes per event/y			20	20	
Simulated Data	Events	Raw size	MB	0.4	300
		ESD	MB	0.04	2.14
	Statistics	Evts/year		1.0E+09	1.0E+07
		Signal evts per bgrd evt			10





Simulation





Parameters for the ALICE Computing model

	Name		Unit	Value		
				pp	PbPb	
Computing		Disk efficiency		0.70		
		scheduled cpu efficiency		0.85		
		chaotic cpu efficiency		0.60		
		CPU	reconstruction of one event	KSi2K s	5.40	675.00
			reconstruction per pass	KSi2K s	6.35E+09	7.94E+10
	analysis of one event		KSi2K s	10.00	300.00	
	simulation of one event		KSi2K s	35.00	15000.00	





Summary of Computing Capacities required by ALICE

	Tier0	Tier1	Tier2	Total
CPU (MSI2K) average	4.47	10.65	14.37	2.95E+01
CPU (MSI2K) max	7.53	10.65	15.00	3.32E+01
Disk (Pbytes)	0.50	6.22	6.45	1.29E+01
MS (Pbytes/year)	1.57	6.48	0.00	8.05E+00

WAN, Bandwidths

Tier0-Tier1s bandwidth	MB/s	800
Tier1 - Tier2 link	MB/s	200

