Service Challenge 4

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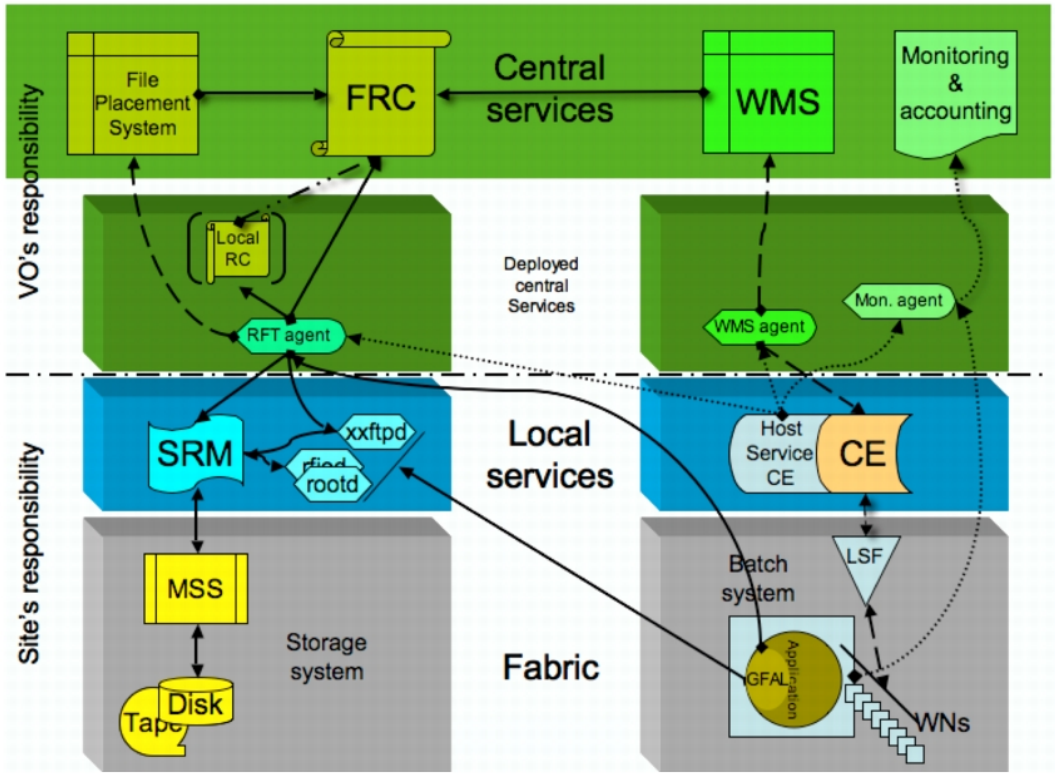
SC4 Requirements

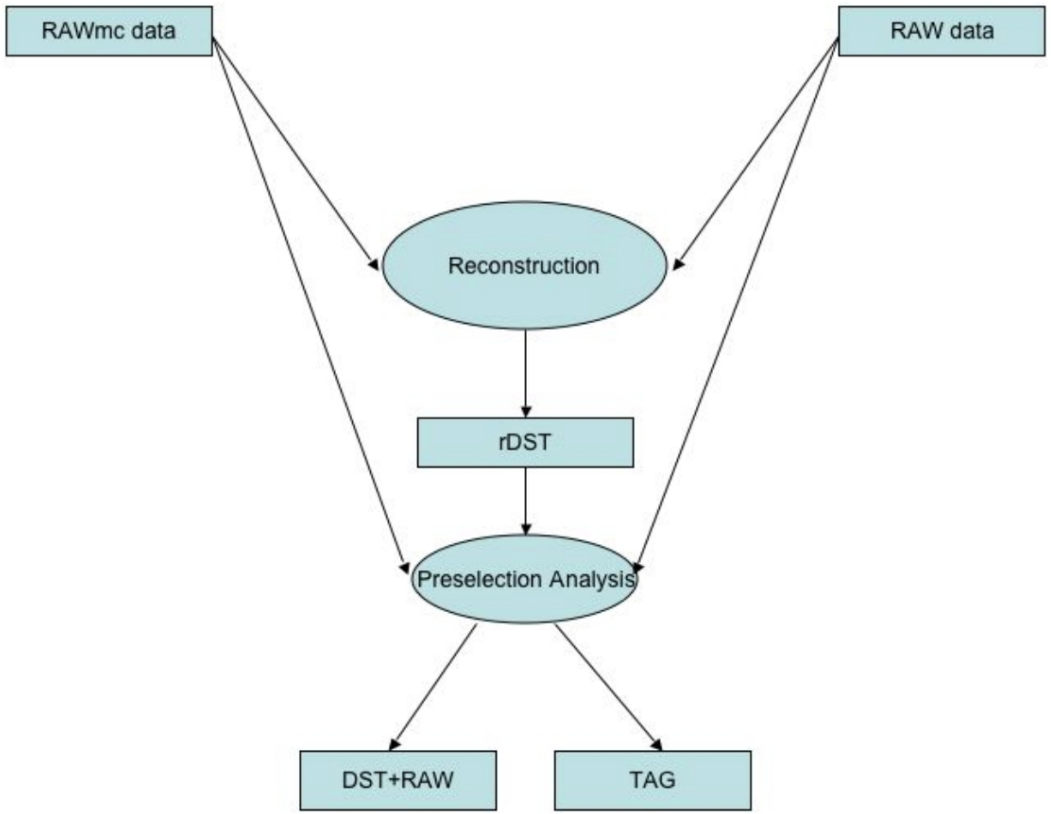
- Data management services
  - SRM standard interface to storage
  - PFN identified with SURL
  - Use FC to retrieve SURL of replica
- Workload management services
  - Use DIRAC as baseline for the WMS
  - Need a host CE each T1 to run a DIRAC agent
  - Alternative: submit pilot agents through LCG RB



Use Case: Data Processing

Data throughput determined by eventsize & rate:

- Dataflow standard
- 2kHz trigger rate (2×10^{10} events)
- RAW: 25 kB
- rDST: 25 kB
- DST: 75 kB
- Reconstruction: 2.4 kSI2k.s
- Stripping: 0.2 kSI2k.s
- Analysis: 0.3 kSI2k.s

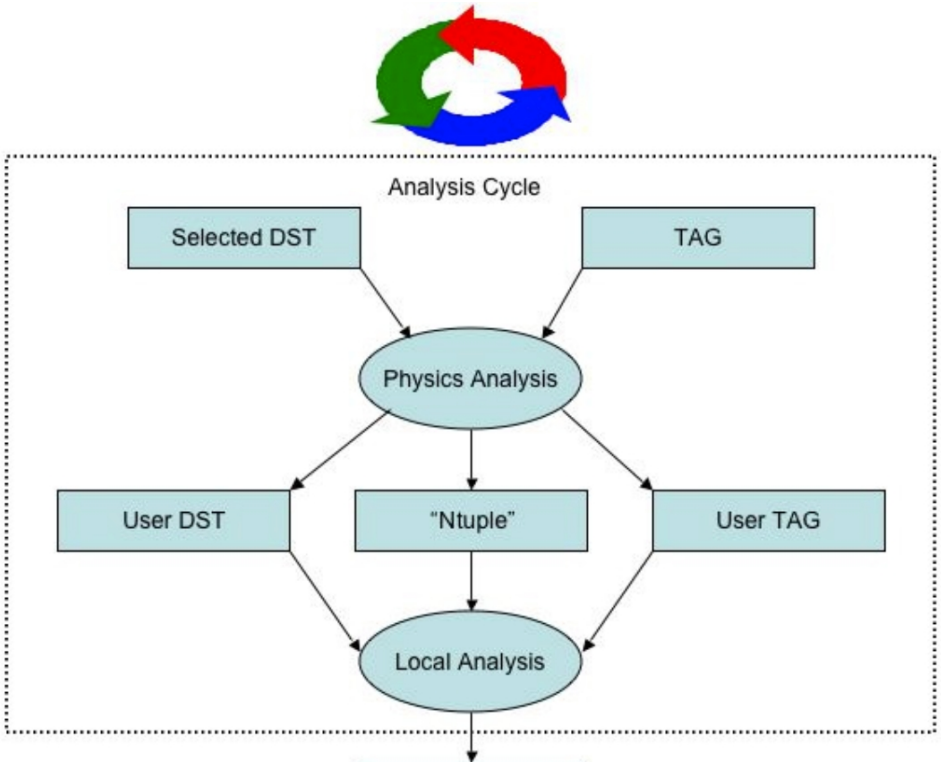


MC Processing

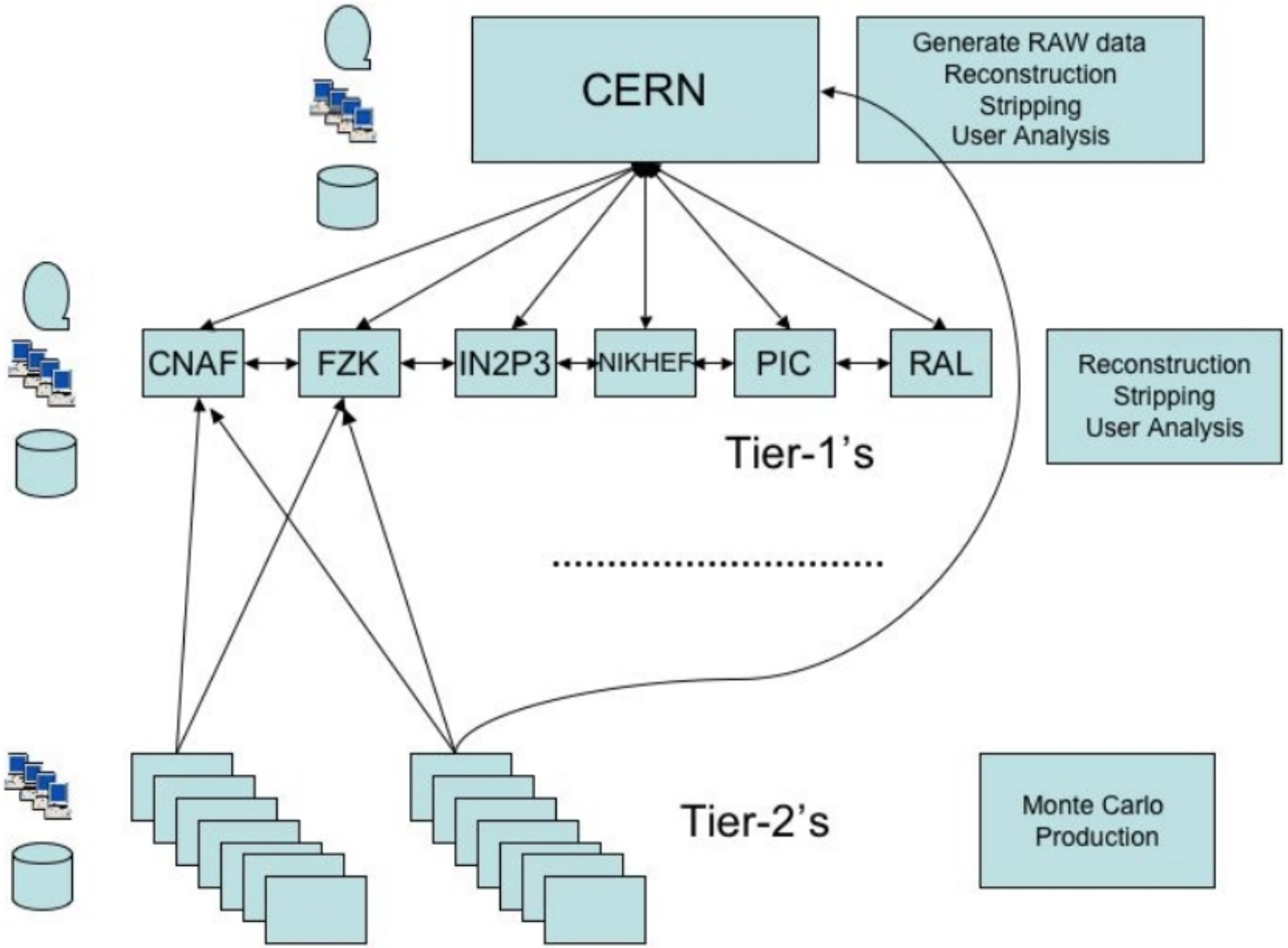
type	Nr. Evts	Storage/evt(kB)	Total Storage(TB)	CPU(MSI2k.yr)
signal & inclusive	4×10^8	800	160	6.5
TAG	4×10^8	2	0.4	0.028

UC: User Analysis

- 140 physicists
- 2 jobs/week
- 2.8×10^6 events
- CPU: 0.78 MSI2k.yr
- Storage: 200 TB



Computing Model



Data Transmission(I)

During Data taking:

Direction	RAW(TB) Outbound	RAW(TB) Inbound	DST (TB) Outbound	DST(TB) Inbound	Network Bandwidth(MB/s)
at CERN $\Leftrightarrow$ T1's	500		119	119	40
at T1 $\Leftrightarrow$ CERN		83	19.8	19.8	6.7
at T1 $\Leftrightarrow$ T1's			102	102	11

Reconstruction and stripping lag few days behind datataking
Re-processing(2 month period):

- 500 TB of input RAW data
- 500 TB of output rDST
- 139 TB of output DST (stripping)

Data Transmission(II)

	rDST(TB) Outbound	rDST(TB) Inbound	DST(TB) Outbound	DST(TB) Inbound	bandwidth (MB/s)
At CERN $\Leftrightarrow$ T1's	181		422	68.7	128
At T1 $\Leftrightarrow$ CERN		30.2	11.5	70.3	21
At T1 $\Leftrightarrow$ T1's			57.3	57.3	22
Additional Stripping (1 month)					
At CERN $\Leftrightarrow$ T1's			119	119	91
At T1 $\Leftrightarrow$ CERN			19.9	19.9	15
At T1 $\Leftrightarrow$ T1's			99.3	99.3	76

"Online" average access rates: CERN: 88MB/s, 6 T1's: 155 MB/s
Re-stripping average access rates: CERN: 107 MB/s, 6 T1's: 379 MB/s

2008 Summary

In MSi2k.years:

	CERN	Tier 1's	Tier 2's	Total
Stripping	0.17	1.03	0.0	1.20
Full Rec.	0.40	2.42	0.0	2.82
Monte C.	0.0	0.0	7.6	7.6
Analysis	0.32	0.97	0.0	1.29
Total	0.9	4.42	7.65	12.97

Disk space requirements:

	CERN	Tier 1's	Tier 2's	Total
RAW	136	0	0	136
rDST	136	0	0	136
Stripped DST	440	1954	23	2417
TAG	45	267	0	312
Analysis	70	210	0	280
Total	826	2432	23	3281

2008 Summary(II)

	CERN	Tier 1's	Total
RAW	500	500	1000
rDST	143	857	1000
Stripped DST	636	636	1272
TAG	80	80	160
Total	1359	2074	3433

Grand Summary

CPU(MSI2k.yr)	2006	2007	2008	2009	2010
CERN	0.27	0.54	0.90	1.25	1.88
Tier 1's	1.33	2.65	4.42	5.55	8.35
Tier 2's	2.29	4.59	7.65	7.65	7.65
Total	3.89	7.78	12.97	14.45	17.88
DISK(TB)					
CERN	248	496	826	1095	1363
Tier 1's	730	1459	2432	2897	3363
Tier 2's	7	14	23	23	23
Total	984	1969	3281	4015	4749
MSS(TB)					
CERN	408	825	1359	2857	4566
Tier 1's	622	1244	2074	4285	7066
Total	1030	2069	3433	7144	11632