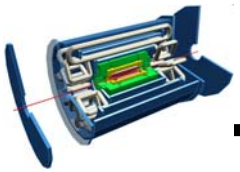
LHC Tiered Computing Model for ATLAS



~Pb/sec

Event Builder

10 GB/sec

Event Filter
~159kSI2k

PC (2004) = ~1 kSpecInt2k

- Some data for calibration and monitoring to institutess
- Calibrations flow back

450 Mb/sec

Tier 0

T0 ~5MSI2k

~9 Pb/year

No simulatio

~ 300MB/s/T1 /expt

Tier 1

US Regional Centre

German Regional Centre

French Regional Centre

UK Regional Centre (RAL)

~2MSI2k/T1

~2 Pb/year/T1

≥622Mb/s

Tier 2

Northern Tier
~200kSI2k

Tier2 Centre
~200kSI2k

Centre
00kSI2k

Centre
00kSI2k

~200 Tb/year/T2

≥622Mb/s

Lancaster
~0.25TIPS

pool

anchester

Sheffield

Physics data cache

100 - 1000
MB/s

Workstations

Desk top

Each Tier 2 has ~25 physicists working on one or more channels

Each Tier 2 should have the full AOD, TAG & relevant Physics Group summary data

Tier 2 do bulk of simulation

ATLAS Computing Model Assumptions

- The ATLAS Computing model has been designed to meet the following assumptions:
  - 100 days running in 2007 (5×10^6 sec live)
  - 200 days running in 2008 and 2009 at 50% efficiency (10^7 sec live)
  - Luminosity:
    - $0.5 * 10^{33}$ $cm^{-2}s^{-1}$ in 2007
    - $2 * 10^{33}$ $cm^{-2}s^{-1}$ in 2008 and 2009
    - 10^{34} $cm^{-2}s^{-1}$ (design luminosity) from 2010 onwards

ATLAS software commitments and RZG resources

- Tier-2s:
  - Run simulation
  - Keep current versions of AODs on disk for analysis
- ATLAS SC3/SC4 Tests
  - Complete Tier-0 test
    - Internal data transfer from "Event Filter" farm to Castor disk pool, Castor tape, CPU farm
  - Calibration loop and handling of conditions data
    - Including distribution of conditions data to Tier-1s (and Tier-2s)
      - Transfer of AOD and TAG data to Tier-2s
  - Data and dataset registration in DB (add meta-data information to meta-data DB)
- Distributed production
  - Full simulation chain run at Tier-2s
    - Data distribution to Tier-1s, other Tier-2s and CAF
  - Reprocessing raw data at Tier-1s
    - Data distribution to other Tier-1s, Tier-2s
- Distributed analysis
  - "Random" job submission accessing data at Tier-1s (some) and Tier-2s (mostly)
  - Generate groups of jobs and simulate analysis job submission by users at home sites
  - Direct jobs needing only AODs as input to Tier-2s

ATLAS software commitments and RZG resources

ATLAS SC4 Plans

- Phase 1: June06 with data distribution to Tier-1s
  - Run integrated data flow tests using the SC4 infrastructure for data distribution
  - Send AODs to (at least) a few Tier-2s
  - First version of shifter's interface tools
- Phase 2: 3-4 weeks in September-October
  - Extend data distribution to all (most) Tier-2s
  - Use tools to distribute calibration data

❑ SC4: distributed reprocessing tests:
  ❑ Test of the computing model using the SC4 data management infrastructure
    ❑ Storage management is also an issue

❑ SC4: distributed simulation intensive tests

❑ **MPI Participation in ATLAS CSC in all the above tests**:
  ❑ It's a continuous running distributed simulation productions all the time
  ❑ Using all Grid computing resources@RZG we have available for ATLAS
    ❑ The aim is to test continuously the ATLAS software chain
      ❑ both for physics users and to build the datasets and DDM for later tests
    ❑ What is the amount of events/week we could manage?

  ❑ Once the above tests are OK, we can use the same infrastructure to implement the ATLAS Computing Model for simulation productions
  ❑ Need same SC4 infrastructure as needed by distributed productions

ATLAS software commitments and RZG resources

- Overview of requirements for SC4
  - DQ2 and ProdSys require a Tier-2 to be associated with a Tier-1
  - This "virtual" association does not bring additional responsibilities to the sites, except:
    - Tier-1 is responsible for setting up and managing the FTS channel to "its" Tier-2s, as requested by ATLAS
    - Tier-2 will use the LFC server on the Tier-1 as its local catalog
  - The "virtual" association is defined by ATLAS (along with the WLCG Collaboration) taking into consideration:
    - FTS channels / network connectivity
    - Available network bandwidth and storage at the Tier-1, wrt to "its" Tier-2s
  - Small testbed with (part of) CERN, a few Tier-1s and a few Tier-2s to test ATLAS distributed systems (ProdSys, DDM, DA) prior to deployment
- A first instance of such a system would be useful already now!