



CMS e Grid a Trieste

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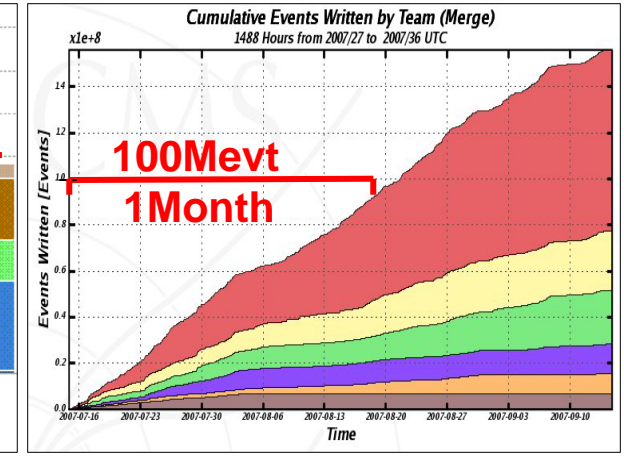
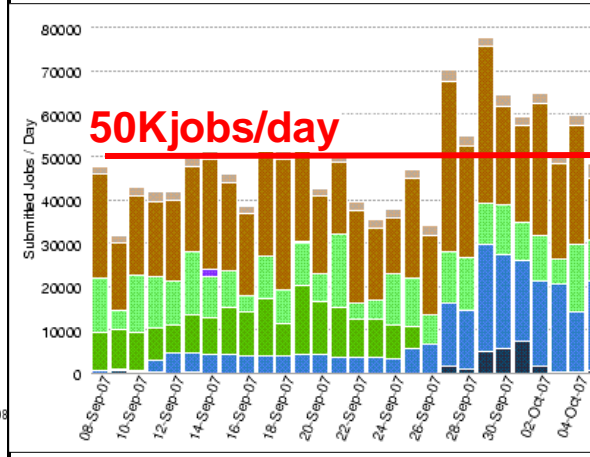
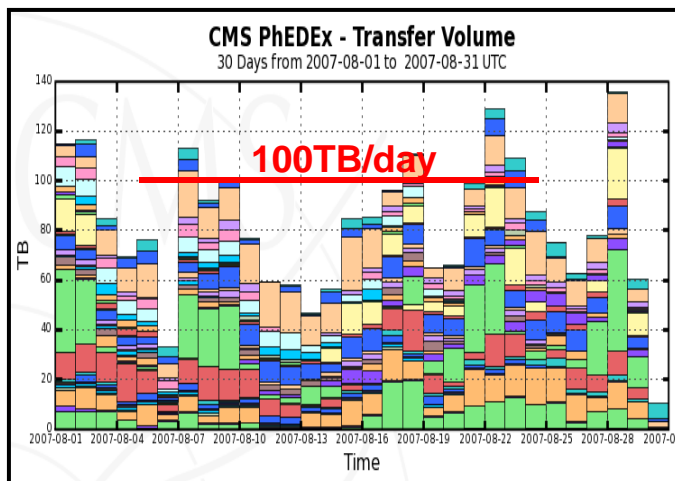


CMS Computing *is* GRID Computing



- **CMS has adopted Grid** (like other LHC experiments)
 - **Completely, entirely, no fall back**
- There is no discussion of "scattered local farms with local submission a' la BaBar, CDF"
- **CMS will use Grid, or fail**
- Scientific success of LHC requires GRID to work
 - At LHC scale
 - ☞ 100 sites, 50K WN's, 10PB, 1K users
 - In production mode
 - With minimum physicist effort
- We will make it and we are making it
- Trieste researchers on the forefront
 - Belforte S.: part of Computing Management team since 3 years
 - Cossutti F.: head of Simulation project
 - Kavka C.: lead developer of distributed computing tools

- CMS GRID resources are located at **CERN (Tier0)**, **seven Tier1's** (CNAF, FNAL, PIC, GridKa, RAL, Lyon, Taipei) and **~50 Tier2's** (in Italy: **Legnaro, Pisa, Roma** possibly **Bari**)
- **Those** sites contribute resources via **MOU's**, "**owned by CMS**"
 - Used according to priorities decided by the collaboration
- Those sites define the success or failure for CMS
 - **T0/T1/T2**, the focus of Computing Project effort, **work!**
- Petabytes of data replicated, transfer rates in excess of 500Mbit/s on single links, 50K jobs/day executing daily on the grid, more than 3Million MC events produced every day (30Hz fully simulated)





What CMS needs at Trieste



- Integration with Grid is a pre-requisite
- Researcher in Trieste need to interact with Grid in many ways
- Develop code and tools for grid
 - Local resources "in grid" for test and debug
 - Local privileged access
- Use the grid for remote data analysis
 - Local resource as portal to the grid
- Use local resources for data analysis of small samples
 - Import to local storage output or remote analysis
 - Interactive access to local storage
- Use local resources to boost local users priority for private production
 - Using same tools as official production
 - Integrate local resources in CMS MC Production Framework
- More advanced usage patterns may be thought of



A Role for Trieste in 2008



- A **CMS Tier3**:
 - Offer same services as Tier2
 - On a smaller scale
 - With no MOU commitment of availability
 - Used to fulfill needs of a local community
Physics analysis and detector studies (ECAL)
- This is possible now (Tier1 and Tier2 exist and work !)
- Requires integration of local resources with Grid
 - Local batch system open to grid submission: in progress
 - Uniform batch system: done
 - Storage accessible from batch farm and interactive nodes: todo
 - Storage accessible from other grid sites: todo
 - Powerful monitoring grid-aware tools: a premium
- More advanced functionalities can be thought of

- Future of *Grid computing* is tighter integration of sites and wider distribution of services
- Mostly made possible by *advances in Networking*
 - Dark fibers across INFN sites
 - Optical path on demand between remote computers
 - The WAN is not the limit anymore
 - Extra large bandwidth and Extra small latency
- Other important trend is *multicore CPU's*
- That implies, e.g.:
 - *CPU in Trieste can read data at T2/T1*
 - *Official MC production can use Trieste* resources storing data at T2, trade for analysis priority at T2 !
 - How to make best use of *future multicore desk(lap)tops ?*
- Create vs. Operate: room for Research, Development, Prototyping...
 - Well focused efforts can give high return
 - Trieste can contributed to expand Grid functionalities, not only use them