



Grid Planning in CMS



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Outline

- CMS Data Challenges
- CMS Production tools
- PCP Strategy and Preparation
- Data Challenge 04



Overview of CMS Data Challenges



➤ Data Challenge 2004 (**DC04** , Feb. 2004) : *5% Data Challenge*

- Validation of the computing model on a sufficient number of Tier-0, Tier-1, Tier-2 sites
- Large scale test of the computing and analysis models



➤ Computing Technical Design Report (Oct. 2004)

➤ Data Challenge 2005 (**DC05** , Feb. 2005): *10% Data Challenge*

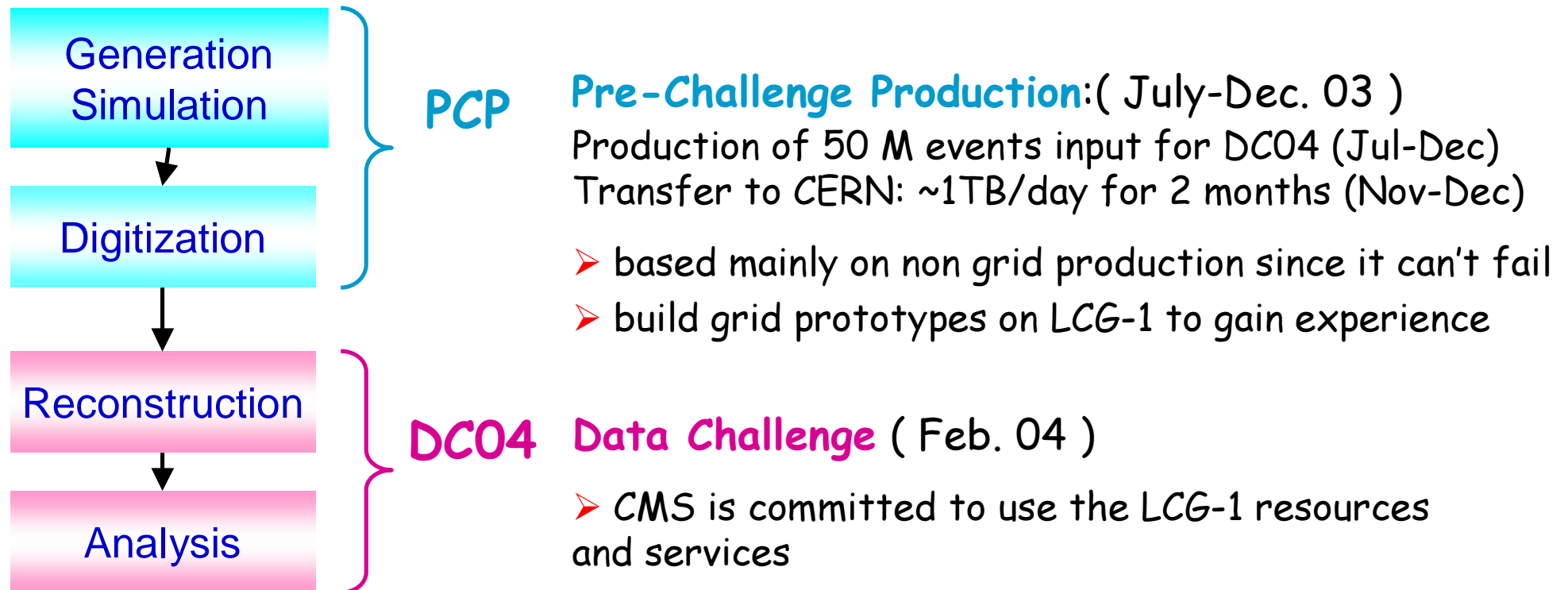
➤ Physics Technical Design Report (end 2005)



Data Challenge 04 & Pre-Challenge



- Reconstruction and analysis on CMS data sustained over one month at a rate which is the 5% of the LHC rate at full luminosity \Rightarrow 25% of start-up luminosity
→ 50 Million events fully digitized events needed as input
- Pre-Challenge : simulation and digitization of data samples





CMS Production tools



➤ CMS production tools (*OCTOPUS*)

▪ RefDB

- ❖ Contains production requests with all needed parameters to produce the dataset and the details about the production process

▪ MCRunJob

- ❖ Evolution of IMPALA: more modular (plug-in approach)
- ❖ Tool/framework for job preparation and job submission

▪ BOSS

- ❖ Real-time job-dependent parameter tracking. The running job standard output/error are intercepted and filtered information are stored in BOSS database. The remote updatator is based on MySQL but a remote updatator based on R-GMA is being developed.



Pre-Challenge Production Strategy



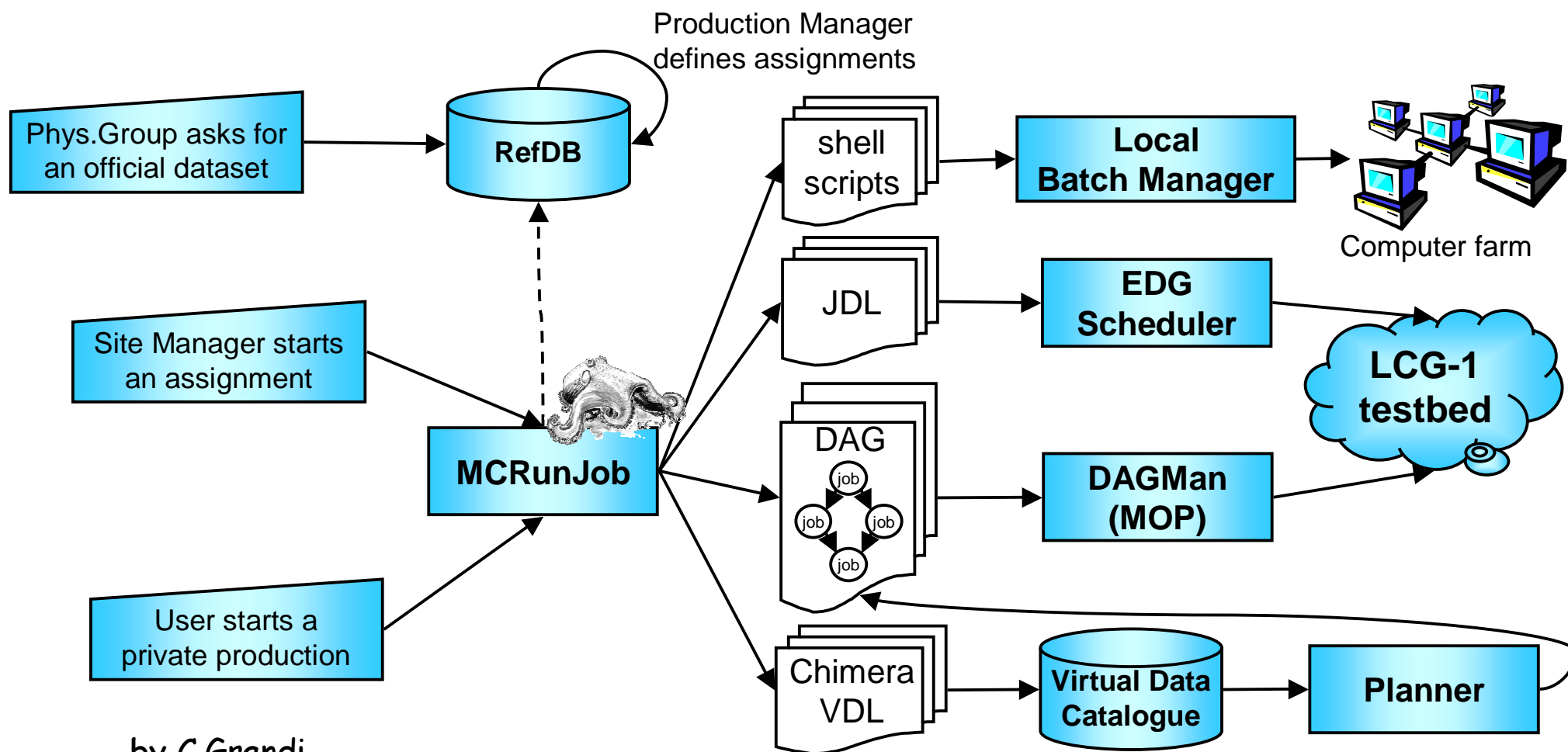
- Flexible production tools that may run both in a local or in a distributed environment (Hybrid model).
- Basically outside the Grid but will use all the Grid tools mature enough.

Within **McRunJob** :

- plug-in to submit to a local resource manager
- Grid based prototypes
 - ❖ Submission to EDG scheduler **in preparation**
 - ❖ Submission to DAGMan/Condor-G (MOP)
 - ❖ producing *derivations* in the Chimera Virtual Data Catalogue

User's Site

Resources



by C.Grandi



Boundary conditions for PCP



- CMS persistency is changing
 - POOL (by LCG) is replacing Objectivity/DB
- CMS Compiler is changing
 - gcc 3.2.2 is replacing 2.95.2
- Operating system is changing
 - Red Hat 7.3 is replacing 6.1.1
- Grid middleware structure is changing
 - EDG on top of VDT



CMS has to deal with all this while preparing for the Pre-Challenge Production!

Preparation Phase for PCP (before July)

➤ Grid Prototypes implementation

▪ Submission to EDG Resource Broker	EDG App. testbed
▪ Submission to DAGMan/Condor-G (MOP)	US CMS testbed
▪ Use Chimera/VDL	

Integration with EDG middleware

1) New CMS tool (**McRunJob**) ⇒ same kind of preparation done before the Stress Test for IMPALA integration within EDG.

❖ Using the same functionalities exploited last year :

WMS, RM (registration in RC, SE staging) on EDG 1.4.X

2) Trying to use **CMS/LCG-0** testbed



Moving to a single testbed (LCG-1) when it will have the needed functionalities



CMS/LCG-0 test environment



- CMS/LCG-0 is a CMS-wide testbed based on the LCG pilot distribution, owned by CMS.
 - Sites involved : CNAF, Padova, Imperial College, EcolePolytechnique, Bologna, Bari, Bristol , Islamabad, Cyprus, Taiwan, some US sites will probably join
 - CNAF already installed and configured, other coming soon.... (~ from this week on)
- Purpose of the CMS/LCG-0 testbed before LCG-1:
 - gain experience with existing tools before start of PCP
 - develop production&analysis tools to be deployed on LCG-1
 - dynamic installation and test of new tools of potential interest to CMS
- Tests foreseen:
 - Test Virtual Organization Management: VOMS
 - Test RLS
 - Test Monitoring tools
 - Practicing with GLUE schema
 - Test R-GMA as BOSS transport layer
 - ❖ Scalability tests using R-GMA as BOSS transport layer already started at Imperial College → Very hard to make tests since R-GMA distribution keep changing and doesn't work on testbed !!



For Pre Challenge Production



Software installation and distribution

- **OCTOPUS** runs only on **UI**
- **CMS programs** (ORCA, OSCAR...) installed on **CE's**
 - pre-installed software: rpm files installed by LCG site administrators
 - installed on demand (if possible): DAR files located using PACMAN or the Replica Manager
 - pile-up data (huge dataset!): on the grid considered as part of the digitization software → to be defined

Data management

- Mapping of logical names to GUID and of GUID to physical file names will be done on the grid by RLS
- Replica Manager service to locate and move the data or direct gridFTP for data transfer
- MSS access using SRM being evaluated

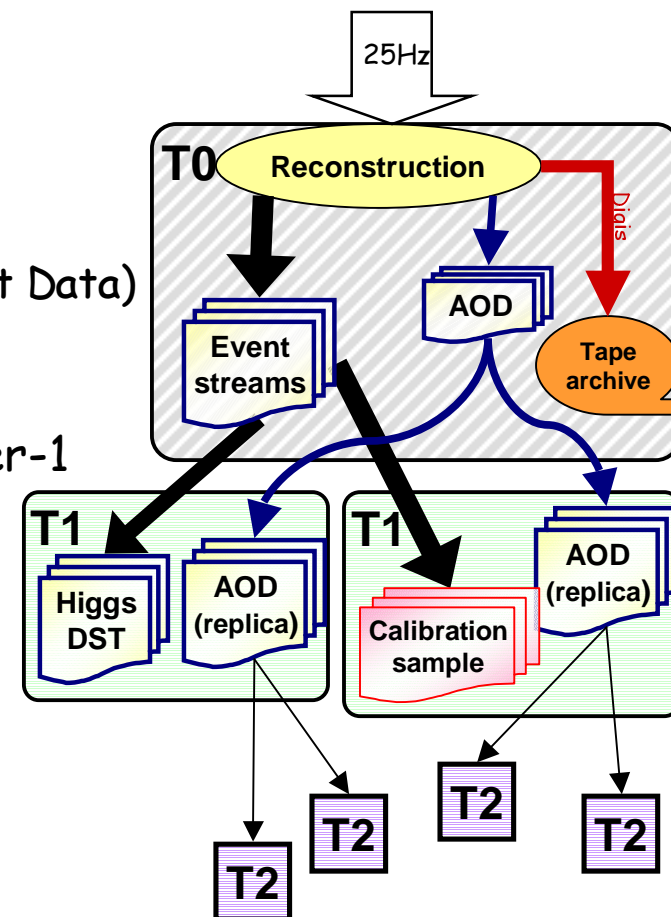
Process data at 25Hz at the Tier-0

Reconstruction and selection of the data at the Tier-0, with distribution to Tier-1, Tier-2 sites:

- Reconstruction produces DST and AOD (Analysis Object Data)
- DST replicated to at least one Tier-1
- AOD replicated to all Tier-1
- Assume Digis are already replicated in at least one Tier-1
- Archive Digis to tape library
- Express lines transferred to selected Tier-1

Analysis and recalibration:

- Produce new calibration data at selected Tier-1 and update the *Conditions* Database
- Analysis from the Tier-2



Much of the strategy will be determined by the results from grid-prototypes during Pre-Challenge Production!



Requirement/Recommendation



Requirements for the LCG-1 testbed:

- **Scalability** in particular for WMS, RLS
- **Reliability** and **Robustness**

We would like to have/use :

➤ Advanced L&B queries	WMS and job handling
➤ JDL preparation interface	
➤ Support for DAGMan as soon as possible	
➤ alias for GUID	Data management
➤ metadata application defined	
➤ VOMS	
➤ Grid Monitoring	
➤ Command line API (since CMS program will use gcc3.2)	
➤ Possibility to disable automatic replication to keep the replication under CMS control	



Summary



- Next CMS computing challenges will be done in a very dynamic environment
- Data Challenge 2004 will be done on LCG-1 (Feb 04)
- Pre-Challenge Production will be the place where to gain experience and use grid prototypes (July-Dec 03)
- Data Challenge architecture will be built on the experience CMS will gain during PCP