



CMS Tier-2 Program for user Analysis Computing

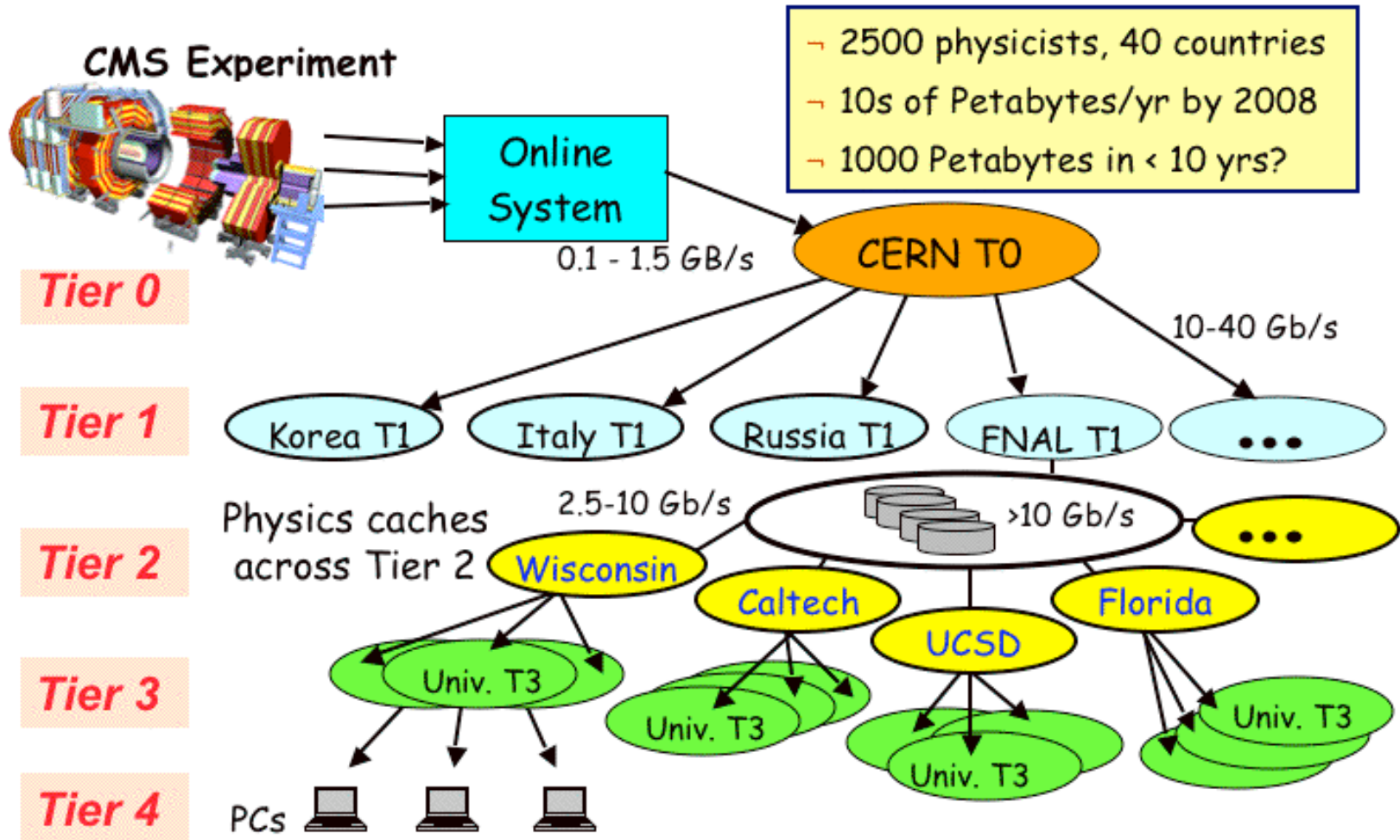
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Context & Requirements
(some) Technical Details
Available Effort & mgmnt

Boundary Conditions for CMS user analysis computing

- CMS Computing Model:
 - Primary location for end user analysis are the 50-100 Tier-2 sites worldwide.
- LHC and the Open Science Grid (OSG)
 - US CMS resources available via OSG

CMS Global Data Grid



Open Science Grid (OSG)

- A “market place” for resource sharing among many scientific communities.
- A forum to transfer IT “know how” among many scientific communities (including CS).
- ***All US CMS computing hardware fully integrated into OSG!***

OSG Philosophy

- Provide a core production infrastructure
 - Set of operational procedures
 - Incidence response, AUP, governance, operations, etc.
 - Limited set of core services
- Enable Communities to “roll their own”.
 - All high level services CMS depends on are fully controlled by CMS.
- Establish coherence across communities
 - Long term technical groups
 - Short term technical activities

High Level Requirements for user analysis computing

- Code Development Environment
 - Compile, run, debug with fast turn around
 - Very agile & reasonably interactive
 - Complete data access at modest IO
- Large scale processing environment
 - Large scale parallelization
 - Large CPU & IO
 - Perfect bookkeeping that's trivial to use
 - Latencies commensurate with resource consumption

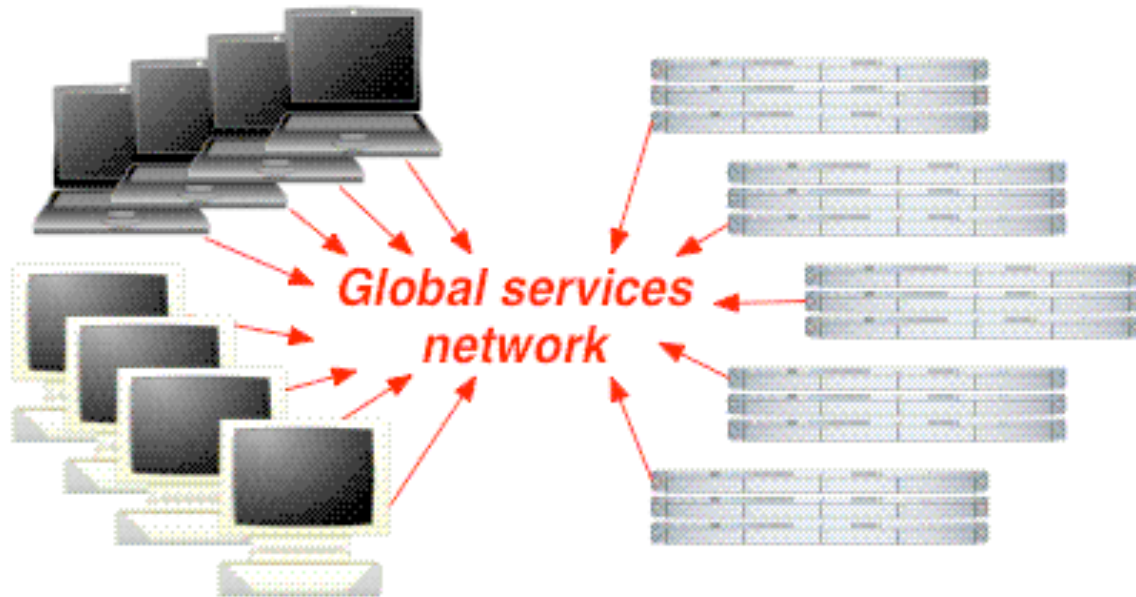
Status Today:

Tier-2s only for MC production

- No data access
- No multi-user environment
- No code development environment
- No reliable submissions interface

**Address this with DISUN,
the CMS Tier-2c proposal**

DISUN Vision



***Connecting thousands of scientists
to hundreds of computing sites
via a global network of services.
DISUN = Integration Effort***

Data Intensive Sciences University Network

- CMS Tier-2c Proposal:
 - 12 FTE across 4 sites (Caltech, UCSD, UFL, UW)
 - ~8 FTE hardware, cyberinfrastructure, user support
 - ~4 FTE integration effort
 - \$1M of hardware per year across 4 sites
 - Tightly embedded into US CMS S&C program via “distributed computing tools” leadership.
 - \$1M from CISE/SCI & \$1.6M from RP

Status in 3 months

- Data access via PhEDEx & SRM/dCache
 - Deployed at UCSD since Monday
 - Work @ Caltech on user interface for data transfer request
- Multi-user environment via Privilege Project.
- No code development environment
- No reliable submissions interface

Status in 9 months

(Baseline software stack for DC06)

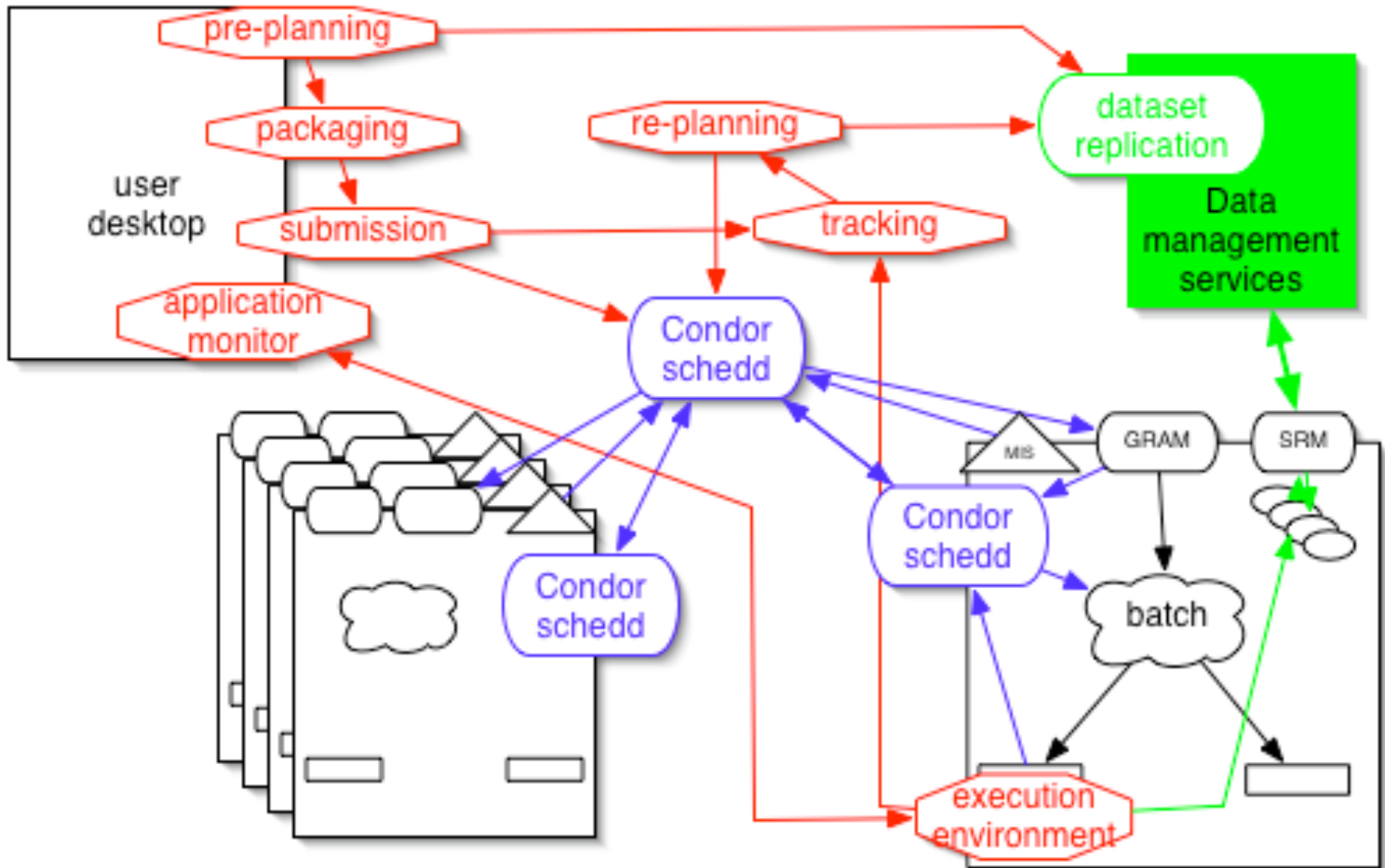
- Data access via PhEDEx & SRM/dCache
- Multi-user environment via Privilege Project.
- Code development environment
 - Dynamic packaging of user code for submission
 - Dynamic installation of core CMS software
 - Interactive read-only access to batch job
- Transition to Condor-C for job submissions

***Expect CMS user community to start
using Tier-2s by next year.***

Effort to make it happen is lead by DISUN

High Level Services Decomposition

(single user view)



The DISUN Model

- Users develop their analysis at their desktop.
- Large scale processing across the Tier-2s and on the grid “as if it was local”.
 - Read-only access to running batch environment.
 - Proof Enabled Analysis Center
- Data distributed across Tier-1 & Tier-2s
 - Initially static, later “just in time” data movement
 - Capacious & intelligent networks enabling cohesion across all Tier-2s.

DISUN Project Goals

- Provide user analysis infrastructure that is fully integrated with the central UAF at Fermilab, as well as user desktops everywhere.
- Deploy first production quality infrastructure towards the end of 2005.
- Incrementally increase functionality over a 5 year period.
- Expect 10^3 - 10^4 parallelization by 2007→2009
- Build on success of Grid3 & CDF CAF

Management & Resources

- Collaboration between:
 - Caltech
 - University of California at San Diego
 - University of Florida
 - University of Wisconsin (HEP & Condor)
 - US CMS S&C project
- Fully integrated into US CMS S&C via “distributed computing tools” group.



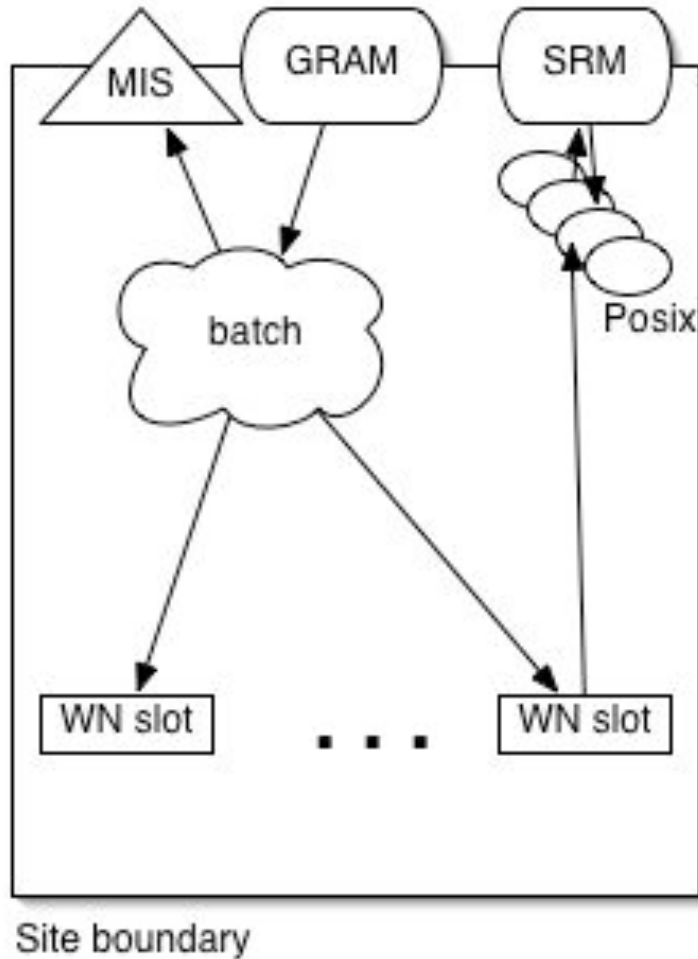
Summary



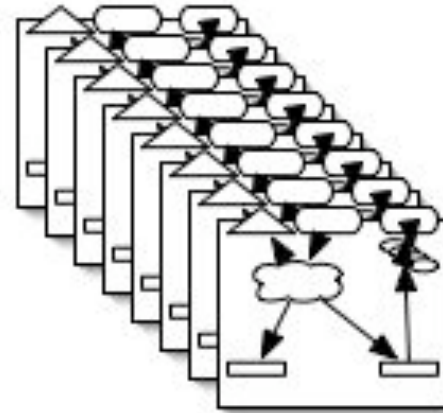
- CMS is getting organized to make user analysis computing at Tier-2 centers a reality.
- Effort depends on Tier-2c funding.
- Effort fully integrated into “distributed computing tools” group in US CMS S&C.
- First useable infrastructure in 1 year.

Backup Slides

OSG Infrastructure 2005



~ 30 sites
several 1000 CPUs
several 100TB disk
several PB tape



Activity on interoperability between EGEE & OSG started.
(See talk by Pordes for more detail.)

Functionality for Summer 2005

- aggressive/optimistic schedule -

- PhEDEx data transfer to Tier-2
 - User level transfer requests (Clarens service)
- Application monitor (based on Clarens)
- Open Science Grid
 - GRAM
 - SRM/dCache
 - Dynamic accounts via Privilege Project
 - Clarens “services gateway”
 - Discovery service
 - Application monitor

Clarens WS Infrastructure

- Robust
 - Built around either Tomcat or Apache
 - 1400 service invocations per second
- Versatile
 - Dynamic service deployment
 - Service registration & discovery
- Secure
 - Based on X509 via SOAP or XMLRPC
 - Granularity at service rather than host level
- Use of Clarens rapidly expanding
 - Grid Analysis Environment (many CMS apps)
 - UltraLight & LambdaStation
 - National Virtual Observatory