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SID ON THE GRID EXPERIENCE AND OUTLOOK

LOI and PostLOI

- 73 million events processed for the LOI and IDAG follow-up questions

   + beam backgrounds

- Generation (whizard)
  - Done by SLAC centrally

- Simulation (SLiC)

- Reconstruction (org.lcsim, MarlinReco)

- User Analysis (AIDA, ROOT)

- SLAC started in September '08

- RAL joined in December '08

SLAC Setup

FTP (wget, curl)

bsub/qsub

NFS

   Huge advantage in accessibility of log files

   POSIX access

Limited by CPU availability

RAL Setup (steps)

- Grid-enabled Storage (Castor)
- Get grid certificate
- Sign up with (DESY, not Fermilab) ILC Virtual Organisation (VO)
  - Not more than one VO per certificate, though!
- Glite-wms-job-submit or edg-job-submit ?
  - Google is not always your friend
  - GridPP pages are a much better entry point (now)
- File Checksums
  - not something I worried about on NFS or FTP
- Limited by disk throughput
  - (Only used RAL storage)

Learning curve

Initial solution

- Manual submission

  - Manual bookkeeping

  - Log files 'hard to parse' at best

- Indiscriminate submission of jobs

- Installation of software in each sandbox

- 84.7 % efficiency

Current solution

- Ganga

  - Better bookkeeping

  - Better logfiles

- Whitelisting of trusted sites

- SidSoft in site-wide area

- 99.8 % efficiency

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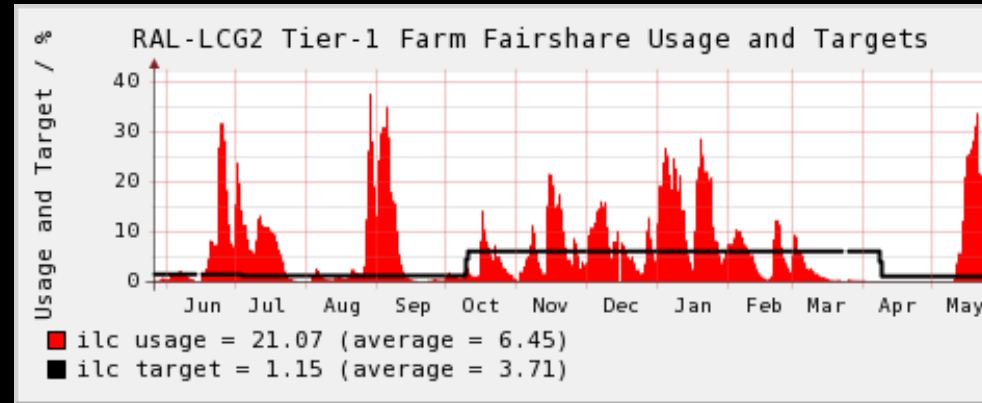
Software installation

- SLiC v2r5p3_geant4-v9r1p2
  - Fairly compiler-agnostic, just called SimDist
- org.lcsim 1.5
  - LHC needs old compilers
  - org.lcsim needs at least Java 1.5
  - → Ship a Java runtime
  - → Drop in the libraries and run
- MarlinReco: ILCSOFT v01-041.6
  - Validated by E. Devetak for SiD
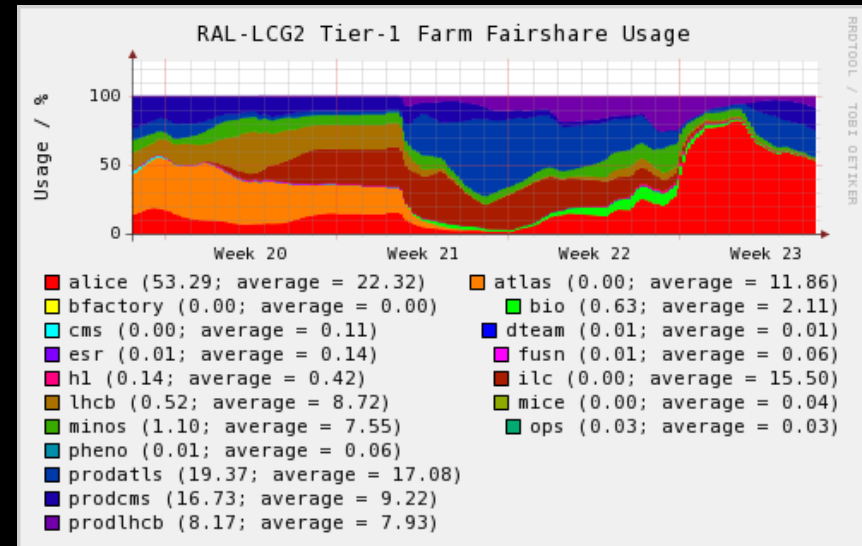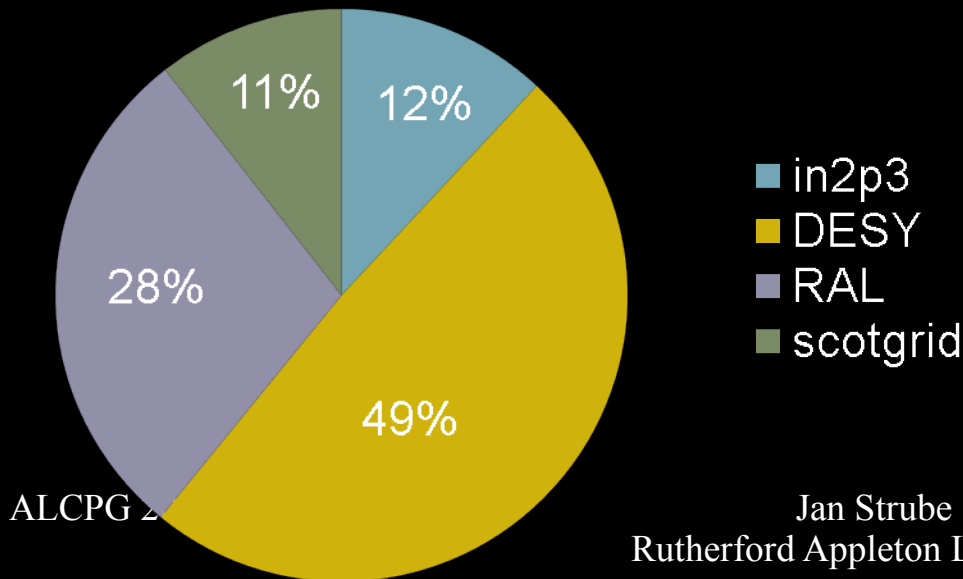 - Flavor tagging tuned by T. Lastovicka

Production Stats

25 different data sets

Production Step	# events
Simulation (SLiC)	42,611,000
Reconstruction	31,991,000
Flavor Tagging	20,446,000

CPU times (for the jobs for which I have this info)

- in2p3 — 12%
- DESY — 49%
- RAL — 28%
- scotgrid — 11%

RAL-LCG2 Tier-1 Farm Fairshare Usage and Targets

ilc usage = 21.07 (average = 6.45)
ilc target = 1.15 (average = 3.71)

RAL-LCG2 Tier-1 Farm Fairshare Usage

alice (53.29; average = 22.32)   atlas (0.00; average = 11.86)
bfactory (0.00; average = 0.00)   bio (0.63; average = 2.11)
cms (0.00; average = 0.11)   dteam (0.01; average = 0.01)
esr (0.01; average = 0.14)   fusn (0.01; average = 0.06)
h1 (0.14; average = 0.42)   ilc (0.00; average = 15.50)
lhcb (0.52; average = 8.72)   mice (0.00; average = 0.04)
minos (1.10; average = 7.55)   ops (0.03; average = 0.03)
pheno (0.01; average = 0.06)
prodatls (19.37; average = 17.08)
prodcms (16.73; average = 9.22)
prodlhcb (8.17; average = 7.93)

Tape inventory

sample	stdhep	SLiC	reco	MarlinReco
SUSY @ 500 GeV	5147	5147	5147	0
sbottom	990	990	926	926
SM @ 250 GeV	936	936	7878	7878
SM @ 500 GeV	575	575	7182	7182
BhaBha sample	6317	6317	6296	0
two-photon backgrounds	0	26454		
top (174 GeV)	0	0	1109	1109
top (174 GeV) w/ bg	0	1034	999	999
top(173.5 GeV)	0	0	1072	1072
Higgs samples (recoil, triple H coupling)	1118	1118	1382	1280
SUM	15083	42571	31991	20446

ALC

RAL Tier1 schedule 2010

CPU allocation

Legend: ALICE, ILC/SiD, ATLAS, CMS, LHCb, SuperB?, H1, MICE, MINOS, NA48/NA62

Labels: MICE, H1, SuperB?, MINOS, NA48/NA62, Pheno, ILC/SiD, ALICE, LHCb, CMS, ATLAS

Disk / Tape allocation

Legend: ALICE, ILC, ATLAS, Dteam/Ops, LHCb, SuperB?, D0, CMS, MICE, MINOS, NA48/NA62

Labels: NA48/NA62, MINOS, MICE, ALICE, ILC, SuperB?, D0, CMS, LHCb, Dteam/Ops, ATLAS
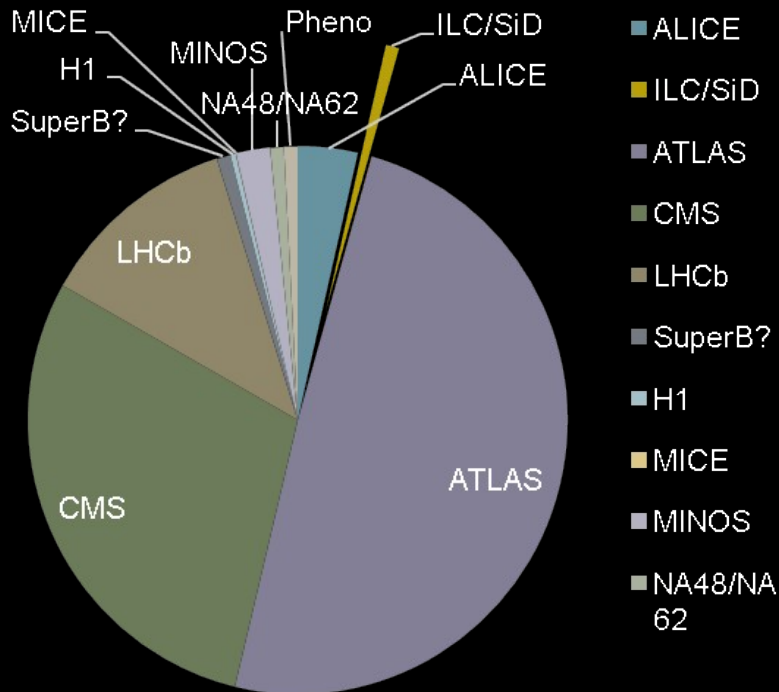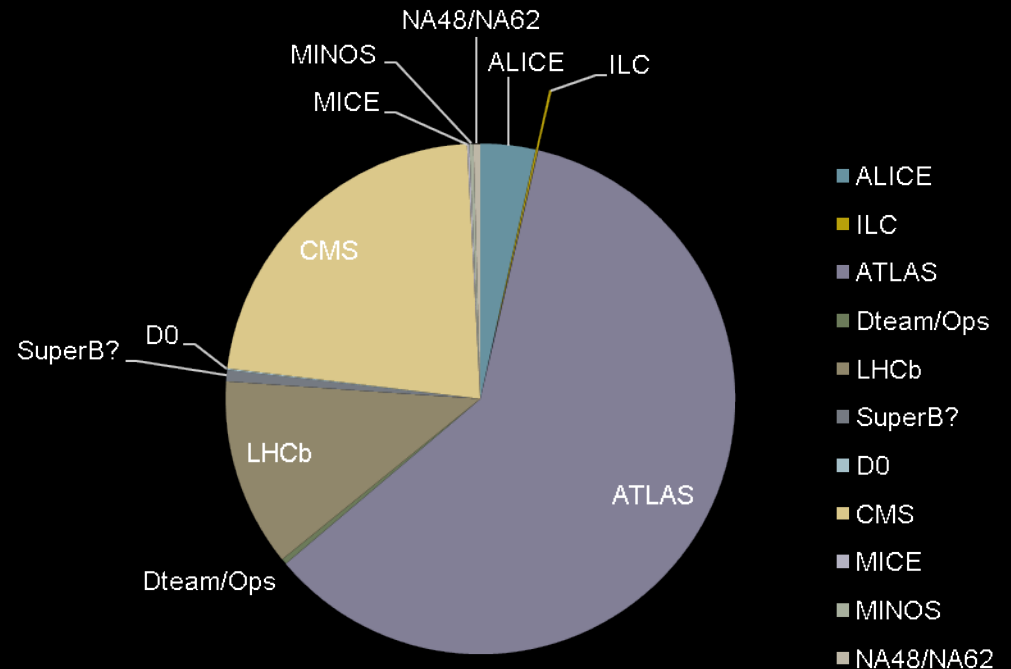
Current Status of 'Middleware'

- 'sidsoft' directory for software installation

  - Currently contains only LOI versions

- Submission scripts have benefited greatly from LOI experience

  - Stability (executable and copy operation)

  - List of trusted sites

  $\rightarrow$ Efficiency: 99.4% in May (postLOI)

  2009 avg.: ATLAS 87 %, CMS 77 %

Current and Future Developments

- File Catalog
  - Consistency between files at SLAC / in the RAL Tier1 castor
  - Production steps / metadata
- Production / Bookkeeping tools
  - Make sure the queues stay filled
  - Automatically, if possible…
- Grid liaison
  - Talking to people in person proved very useful during LOI production
  - Keep track of software versions / validations of external packages, publication of software tags at designated sites
  - Coordinate w/ ILD
- File size requirements
  - Castor likes larger files (~5 GB)
- Exploit concurrency

Summary

- LHC Computing Grid played an essential role in the SiD LOI effort
- LOI production was completed
  - Lauded in IDAG report
  - Without prior experience
  - Helped by LHC misfortune
- The LCG is a vast resource
  - We'd be wise to use it
 - But should use it wisely

THANK YOU

BACKUP

Imperial College

- New switches – this should enable us to integrate 300 TB of storage seamlessly into the cluster.
- dCache - Lots of small issues:
  Hardware tweaks/headnode transferred to more powerful machine.
  Suspended files not automatically retried.
- dCache has been the main cause of our downtimes (hotly followed by College turning off the power on Saturdays: no weekend coverage of Tier 2s)

Tier 1 outages affecting ILC in past year

- 30 Scheduled 'At Risk' events
  - Time: 37 days, 8 hours
- 18 Unscheduled 'At Risk' events
  - Time: 18 days, 14 hours
- 23 Scheduled 'Outage' events
  - Time: 38 days, 21 hours
- 39 Unscheduled 'Outage' events
  - Time: 37 days, 8 hours

SEVERITY

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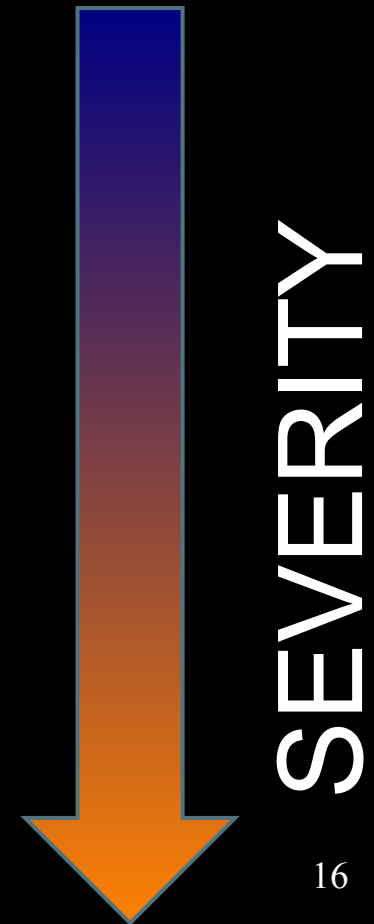
The others

- ATLAS, CMS:
  - Infinite resources
- MINOS: Already working on ganga-based submission script
  - 50 Million events
- MICE: N / A
- H1: low-scale production
- BaBar: Using resources (CPU, Disk), but not middleware

Data Rates

- 1 even + several underlying events every 25 ns

- 100s of particles in every event

- Event size: few MB

- 1 event every 200 ms

- 10s of particles in every event

- Event size: ~50 kb

1 GB / s

LHC

1MB / s

ILC