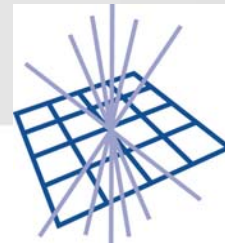CCLRC

RAL and UK Plans and Outlook

LCG Service Challenge Meeting
January 27-28, 2005
Rutherford Appleton Laboratory

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GridPP
UK Computing for Particle Physics

THE UNIVERSITY
OF BIRMINGHAM

CCLRC

BRUNEL
UNIVERSITY
WEST LONDON

CERN

UNIVERSITY OF
CAMBRIDGE

University
of Durham

THE UNIVERSITY OF EDINBURGH

UNIVERSITY
of
GLASGOW

Imperial College
London

LANCASTER
UNIVERSITY

University of Bristol

THE UNIVERSITY
of LIVERPOOL

WAR

THE UNIVERSITY
of MANCHESTER

UNIVERSITY · OF · OXFORD

Queen Mary
University of London

Royal Holloway
University of London

THE UNIVERSITY OF SHEFFIELD
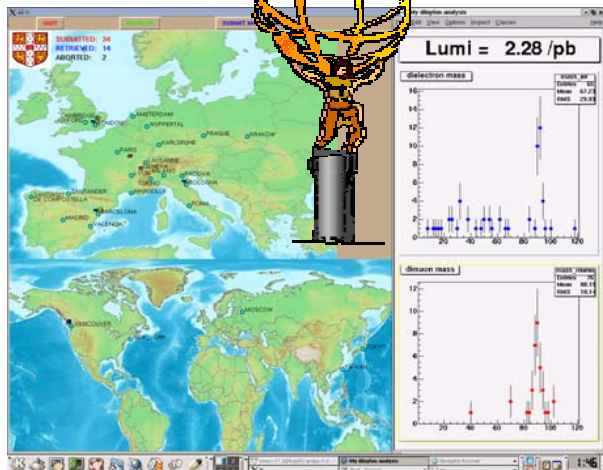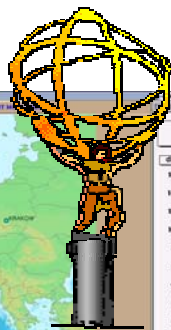
THE UNIVERSITY OF
SUSSEX

PRIFYSGOL CYMRU ABERTAWE
UNIVERSITY OF WALES SWANSEA

UCL

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Multiple Experiments

ATLAS

LHCb
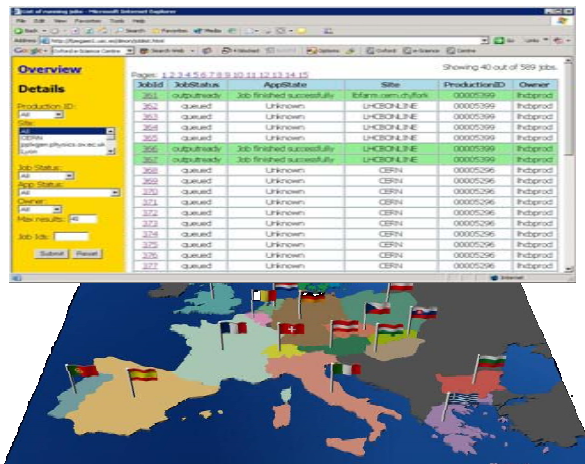
CMS
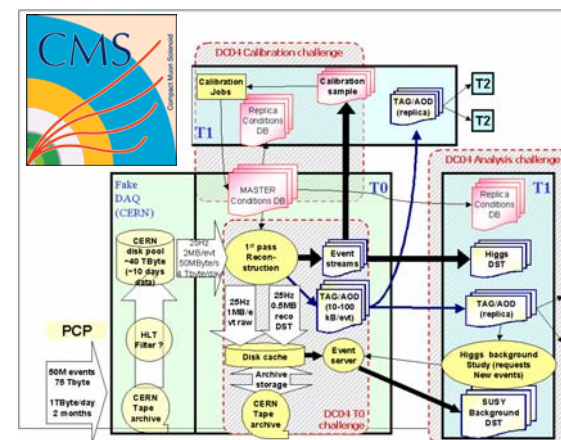
BaBar (SLAC)

SAMGrid (FermiLab)

QCDGrid

PhenoGrid
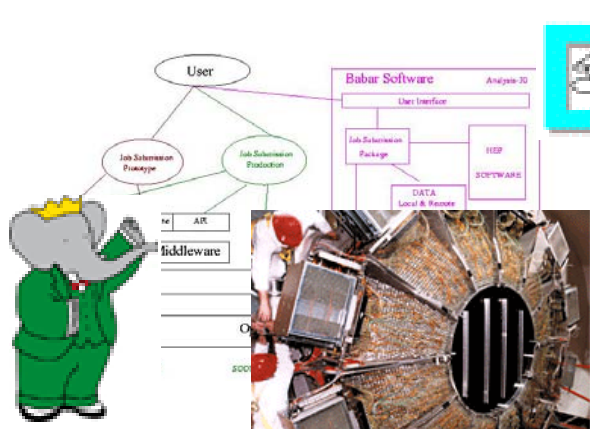
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- High quality data services
- National and international role
- UK focus for international Grid development

1000 CPU
200 TB Disk
60 TB Tape
(Capacity 1PB)
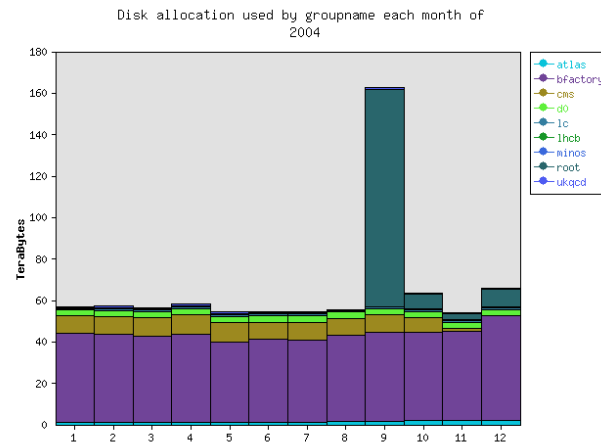
Grid Resource Discovery Time = 8 Hours

2004 Disk Use

2004 CPU Utilisation
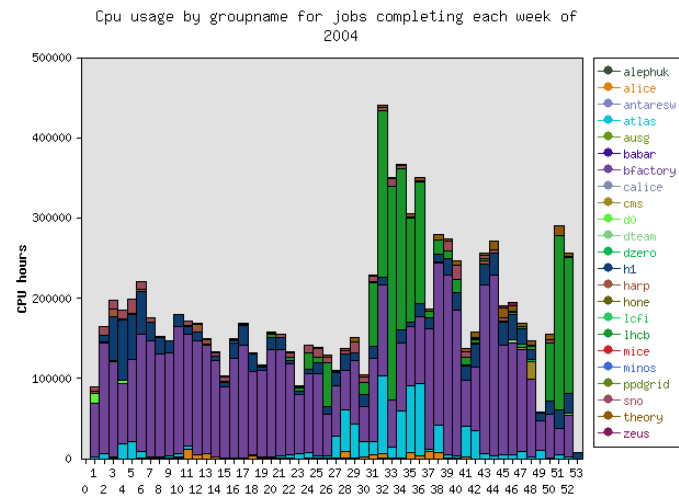
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424 CPU years (4,000 kSI2k months), 186M events

- UK's input significant (>1/4 total)
- LCG(UK) resource:
  - Tier-1   7.7%
  - Tier-2 sites:
  - London 3.9%
  - South 2.3%
  - North 1.4%
- DIRAC:
  - Imperial 2.0%
  - L'pool   3.1%
  - Oxford   0.1%
  - ScotGrid 5.1%

Entering Grid Production Phase..

186 M Produced Events

Phase 1 Completed

$3-5 \times 10^6$/day

LCG restarted

LCG paused

LCG in action

1.8×10^6/day

DIRAC alone

Events integrated : All jobs with ANY known replica

Signal
Inclusive b
Minimum bias

Data Challenge

- 7.7 M GEANT4 events and 22 TB
- UK ~20% of LCG
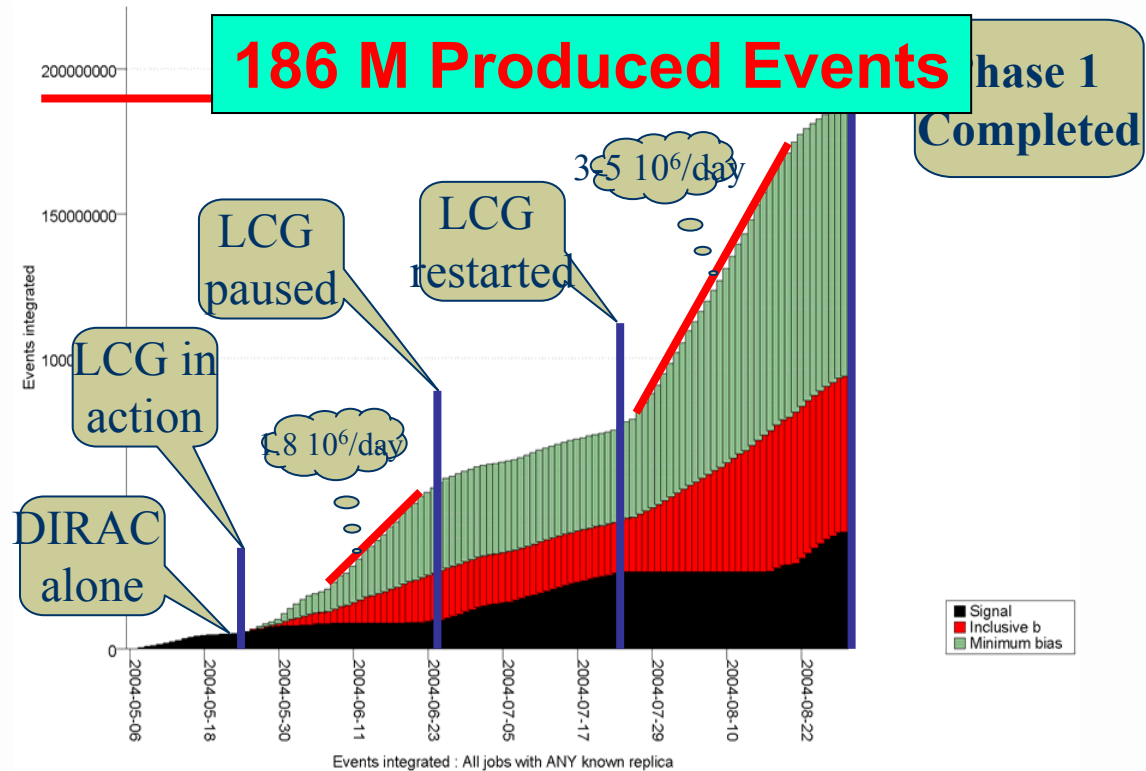
- Ongoing..
- (3) Grid Production
- ~150 CPU years so far
- Largest total computing requirement
- Small fraction of what ATLAS need..

Entering Grid Production Phase..

ATLAS DC2 - LCG - September 7

ATLAS DC2 - CPU usage

Grid3
29%

LCG
41%

NorduGrid
30%

14%
3%
1%
3%
9%
8%
3%

Legend:
- at.uibk
- ca.triumf
- ca.ualberta
- ca.umontreal
- ca.utoronto
- ch.cern
- cz.golias
- cz.skurut
- de.fzk
- es.ifae
- es.ific
- es.uam
- fr.in2p3
- it.infn.cnaf
- it.infn.lnl
- it.infn.mi
- it.infn.na
- it.infn.na
- it.infn.roma
- it.infn.to
- it.infn.lnf
- jp.icepp
- nl.nikhef
- pl.zeus
- msu
- sinica
- bham
- uk.ic
- uk.lancs
- uk.man

- LCG
- NorduGrid
- Grid3

Total:
~ 1350 kSI2k.months
~ 95000 jobs
~ 7.7 Million events fully simulated (Geant4)
~ 22 TB

Capacity Planning

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Table of Estimated Shares. Units are in TB and kSI2k as appropriate.																
September 2	**2005**			**2006**			**2007**			**2008**			*2010*			
	Dis	kCPU	Tap	Dise	kCPU	Tap	Dis						Disk	CPU	Tape	
Available	457	1508	882											9143	2100	
ALICE	6	19	20												*61*	
ATLAS	124	436	1												*942*	
CMS	95	100													*491*	
LHCb	20														*79*	
LCG Total	245														*1573*	
BaBar	84														24	
CDF	17	8													0	
D0	45	3													66	
H1	42													147	115	
MINOS	3	4											16	317	311	
SNO	19	25											50	76	12	
ZEUS	0	126	0	0									0	0	423	0
PhenoGrid	0	11	0	1	2							3	128	0	2	116	0
UKQCD	2	23	0	7	48	0	22	91				59	210	0	53	189	0
Total	457	1508	882	748	2456	1500	131 04276	2100	2087	6631	2100	3557	10163	2100	3205	9143	2100

Still in the Planning Phase.

Not to be used elsewhere

Tier1 Planning

- Planning tool to balance requirements, finance, and technology foresight
- This gives plan for how we share the resources
- Turned into 1/4ly allocations by UserBoard
- Used in allocating disk and batch shares
  - cpu isn't a hard limit, just guidance to the batch scheduler
  - Tier1A Manager and UB chair can vary in response to circumstances

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ScotGrid

Durham, Edinburgh, Glasgow

NorthGrid

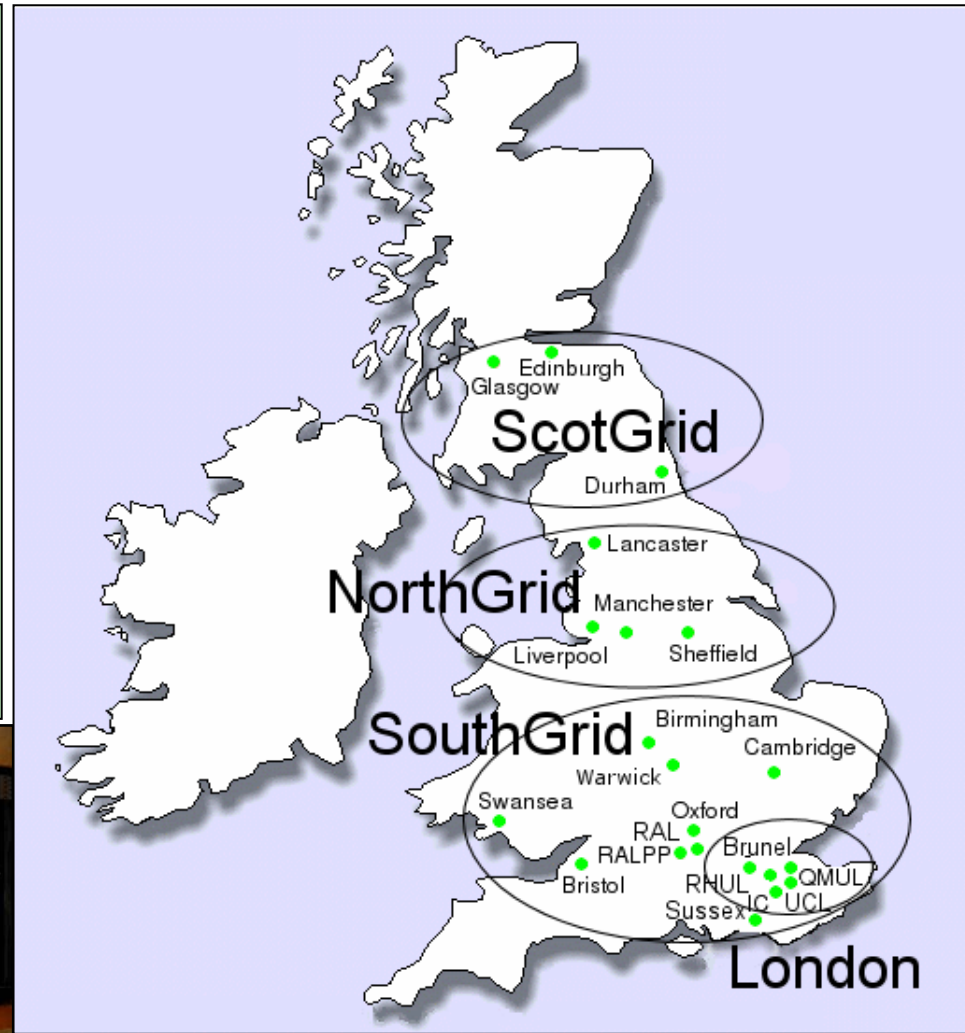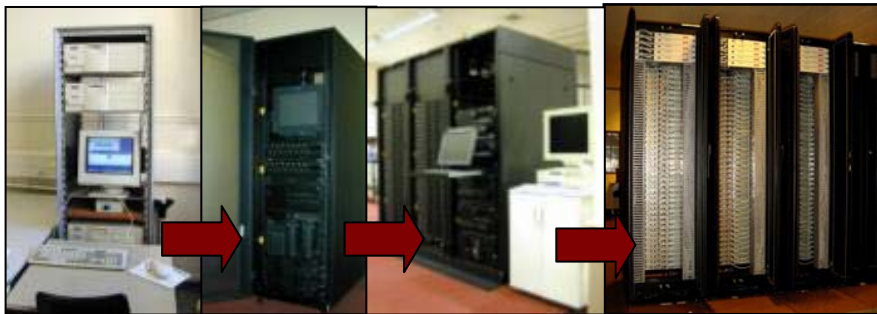Daresbury, Lancaster, Liverpool, Manchester, Sheffield

SouthGrid

Birmingham, Bristol, Cambridge, Oxford, RAL PPD, Warwick

LondonGrid

Brunel, Imperial, QMUL, RHUL, UCL

Edinburgh
Glasgow
ScotGrid
Durham
Lancaster
NorthGrid Manchester
Liverpool Sheffield
SouthGrid Birmingham
Cambridge
Swansea Warwick
Oxford
RAL Brunel
RALPP QMUL
RHUL IC UCL
Bristol Sussex
London

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Tier-2 Board Membership

Chair: Steve Lloyd
4 Tier-2 Regional Management Board Chairs:
Dave Colling, Roger Jones, Phil Clark, Jeff Tseng
4 Tier-2 Technical Coordinators:
Owen Maroney, Alessandra Forti, Fraser Speirs, Rhys Newman
Production Manager: Jeremy Coles
Tier-1 Board Representative: John Gordon
User Board Representative: tbd
Deployment Board Representative: Dave Kelsey

Attempting to determine what the 'fair shares' of the Tier-2 resources are.

Linear Collider

Institute	Facility	No of CPUs	Total CPU (KSI2000)	Total Formatted Disk (TB)	HEP Share	Nominal Experiment Shares							
						ALICE	ATLAS	CMS	LHCb	BaBar	CDF	D0	Other
QMUL	E-Science Cluster	344	354.0	36.0	75%		50%			15%			35%
QMUL	BaBar Farm	80	33.0	1.0	100%					100%			

Multiply each resource by HEP Share and experiment share (+ time/belief weight) and integrate over all institutes.

Preliminary!

Raw data needs to be checked/updated

	CPU	Disk
ALICE	2%	0%
ATLAS	37%	42%
CMS	7%	4%
LHCb	11%	13%
BaBar	12%	14%
CDF	3%	4%
D0	12%	14%
Other	16%	9%

GridPP
UK Computing for Particle Physics

- Survey of Tier2 provided commitments of resources to GridPP

	CPU (KSI2K)	Disk (TB)
London	1820	139
NorthGrid	2602	543
ScotGrid	271	102
SouthGrid	701	49

T2 Experiment Shares

	CPU (KSI2K)				Disk (TB)			
	2004	**2005**	**2006**	**2007**	**2004**	**2005**	**2006**	**2007**
ALICE	75	85	108	109	12	13	15	15
ATLAS	1661	1874	2389	2412	275	295	335	338
CMS	313	353	450	454	52	56	63	64
LHCb	468	528	673	680	77	83	94	95
BaBar	507	571	728	735	84	90	102	103
CDF	162	183	233	236	27	29	33	33
D0	507	572	730	737	84	90	102	103
Other	703	793	1011	1021	116	125	142	143
Total	4397	4960	6322	6382	728	781	887	894

- **We have defined shares but applying them across T2s will be more complex**

Presenter Name

Facility Name

Issues

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- Moores Law and other hardware unknowns
- Long lead times on Mass Storage acquisitions
- Overcomplication, reliability and maintainability of Middleware
- Conflict between experiment demands
  - and understanding the computing models
- Balance between 2008 and 2005-7
  - buying hardware that isn't used weakens the case for the hardware that will be required in 2008, also true for networking
- T1-T2 Issues – still needs investigation

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Summary

- UK has a working Tier1
  - Engaged with (most) experiments and contributing to DCs
- UK has an impressive range of Tier2 resources available
  - A good fraction are on the grid
- Challenges
  - Improve quality of integrated management
  - Copying with middleware
  - Keep up with the increasing demands

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