GRIP UK Particle Physics

UK HEP Grid Deployment

John Gordon

eScience Centre

CLRC-RAL

LCG Launch Workshop

13th March 2002

GRIP UK Particle Physics

GridPP - The UK Grid for Particle Physics - Netscape

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The Grid for UK Particle Physics

The GridPP Project

GridPP is a collaboration of Particle Physicists and Computing Scientists from the UK and CERN, who are building a UK Grid for Particle Physics.

The Grid refers to an infrastructure that enables the integrated, collaborative use of high-end computers, networks, databases, and scientific instruments owned and managed by multiple organizations.

GridPP will deliver the Grid software (middleware) and hardware infrastructure to enable testing of a prototype of the Grid for the Large Hadron Collider (LHC) project at CERN of significant scale. The **GridPP** project is designed to integrate with the existing Particle Physics programme within the UK, thus enabling early deployment and full testing of Grid technology and efficient use of limited resources. The project will disseminate **GridPP** deliverables in the multi-disciplinary e-Science environment and will seek to build collaborations with emerging Grid activities both nationally and internationally.

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Plans for Tier1's and 2's

- Hardware
- Personnel (support & development for LCG activities)
- Software
- Network

Hardware

- Tier1 (and Babar TierA) at RAL

UK Tier1/A Status

Current EDG TB setup
14 Dual 1GHz PIII, 500MB RAM 40GB disks
Compute Element (CE)
Storage Element (SE)
User Interfaces (UI)
Information Node (IN)
+ Worker Nodes (WN)

+Central Facilities (Non Grid)
250 CPUs
10TB Disk
35TB Tape
(Capacity 330 TB)

Hardware Purchase for delivery today
156 Dual 1.4GHz 1GB RAM, 30GB disks (312 cpus)
26 Disk servers (Dual 1.266GHz) 1.9TB disk each
Expand the capacity of the tape robot by 35TB

Hardware

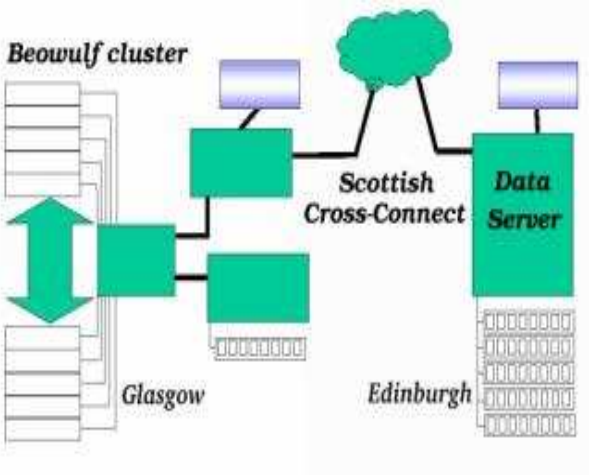
- Tier1 (and Babar TierA) at RAL
- UK plans approx 4 Tier2 centres, not yet clear which
  - Candidates include Imperial/UCL/QMW, Manchester/Liverpool/Lancaster, Bristol, Cambridge, Oxford, Birmingham ScotGrid
  - Regional?

UK Tier-2 Example Site - ScotGRID

ScotGrid Processing nodes at Glasgow

59 IBM X Series 330 dual 1 GHz Pentium III with 2GB memory

- 2 IBM X Series 340 dual 1 GHz Pentium III with 2GB memory and dual ethernet
- 3 IBM X Series 340 dual 1 GHz Pentium III with 2GB memory and 100 + 1000 Mbit/s ethernet
- 1TB disk
- LTO/Ultrium Tape Library
- Cisco ethernet switches



ScotGrid Storage at Edinburgh

- IBM X Series 370 PIII Xeon with 512 MB memory 32 x 512 MB RAM
- 70 x 73.4 GB IBM FC Hot-Swap HDD

Griddev testrig at Glasgow

- 4 x 233 MHz Pentium II

BaBar UltraGrid System at Edinburgh

- 4 UltraSparc 80 machines in a rack 450 MHz CPUs in each 4Mb cache, 1 GB memory
- Fast Ethernet and MirrorNet switching

CDF equipment at Glasgow

- 8 x 700 MHz Xeon IBM xSeries 370 4 GB memory 1 TB disk

One of (currently) 10 GridPP sites running in the UK

Projected Staff Effort [SY]

Area	GridPP	@CERN	CS
WP1 Workload Management	0.5	[IC]	2.0 [IC]
WP2 Data Management	1.5++	[Ggo]	1.0 [Oxf]
WP3 Monitoring Services	5.0++	[RAL, QMW]	1.0 [HW]
Security	++	[RAL]	1.0 [Oxf]
WP4 Fabric Management	1.5	[Edin., L'pool]	
WP5 Mass Storage	3.5++	[RAL, L'pool]	
WP6 Integration Testbed	5.0++	[RAL/M'cr/IC/Bristol]	
WP7 Network Services 2.0	[UCL/M'cr]		1.0 [UCL]
WP8 Applications	**17.0**		
ATLAS/LHCb (Gaudi/Athena)	6.5 [Oxf, Cam, RHUL, B'ham, RAL]		
CMS	3.0 [IC, Bristol, Brunel]		
CDF/D0 (SAM)	4.0 [IC, Ggo, Oxf, Lanc]		
BaBar	2.5 [IC, M'cr, Bristol]		
UKQCD	1.0 [Edin.]		
Tier1/A	13.0 [RAL]		
Total	**49.0++**	**10.0 ->25.0**	**6.0 = 80++**

Tier1/2

- Tier1/A 9FTE --> 13FTE in 2002
- Tier2 Effort not accounted yet
  - from universities and other projects

LCG Effort

- Significant new effort for LCG from UK, all based at CERN

Software

- No special software holdings or plans for Tier1
- Rely on HEP-wide deals for everything so far
  - May need to plan for Oracle or similar
- Software development is middleware and experiment grids
  - no knowledge of UK experiment software development

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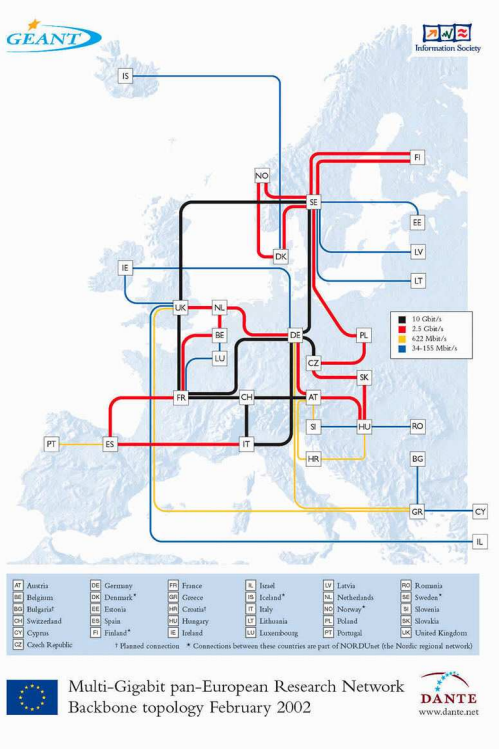
Network

- Tier1 internal networking will be a hybrid of
  - 100Mb to nodes of cpu farms with 1Gb up from switches
  - 1Gb to disk servers
  - 1Gb to tape servers
- UK academic network SuperJANET4
  - 2.5Gbit backbone upgrading to 20Gb in 2003
- RAL has 622Mb into SJ4
- SJ4 has 2.5Gb interconnect to Geant
- New 2.5Gb link to ESnet and Abilene just for research users
- UK involved in networking development
  - internal with Cisco on QoS
  - external with DataTAG



Certification Authority - status & plans

- UKHEP CA has been signing certificates since October 2000
  - Trusted by EDG
  - Trusted by DoE
    - recent transatlantic transfers by D0 between FNAL and UK publicised by PPDG as first external use of DoE CA
- UK Grid Support Centre setting up UK CA for UK eScience
  - based on OpenCA
  - HEP users will migrate to it over 2002

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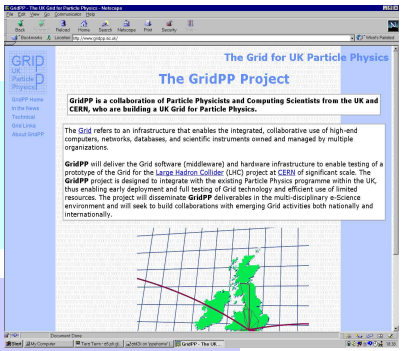
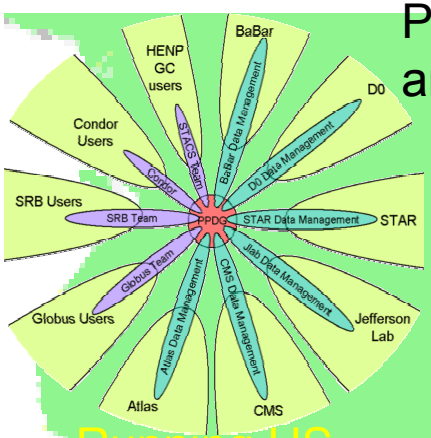
GridPP Deployment



Provide architecture and middleware



Running US Experiments

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Future LHC Experiments

Use the Grid with real data

Build Tier-A/prototype Tier-1 and Tier-2 centres in the UK and join worldwide effort to develop middleware for the experiments

Use the Grid with simulated data

DataGrid Deployment

- RAL and Manchester in EDG TB1
- Expanding now to a core of 4 sites (Manchester, Bristol, Imperial, RAL) lead by Manchester
- EDG TB1 presence at most UK HEP sites over the next few months
- Expand RAL testbed to include production facilities if required
- Include substantial resources at other UK sites
- ...including non-HEP Centres

Other Grid Deployment

- But GridPP will not just be EDG Testbed

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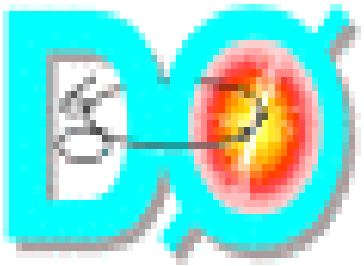

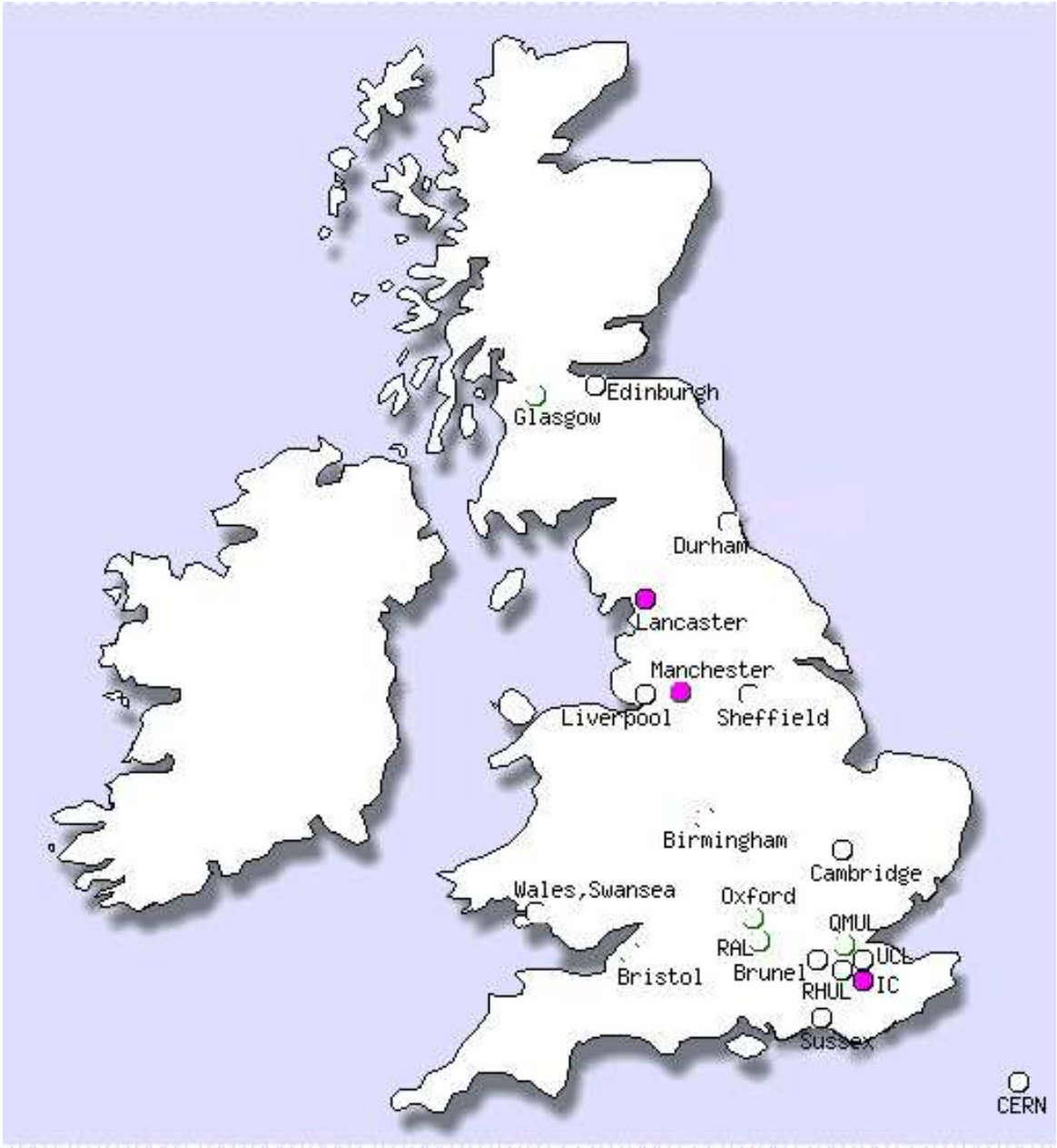

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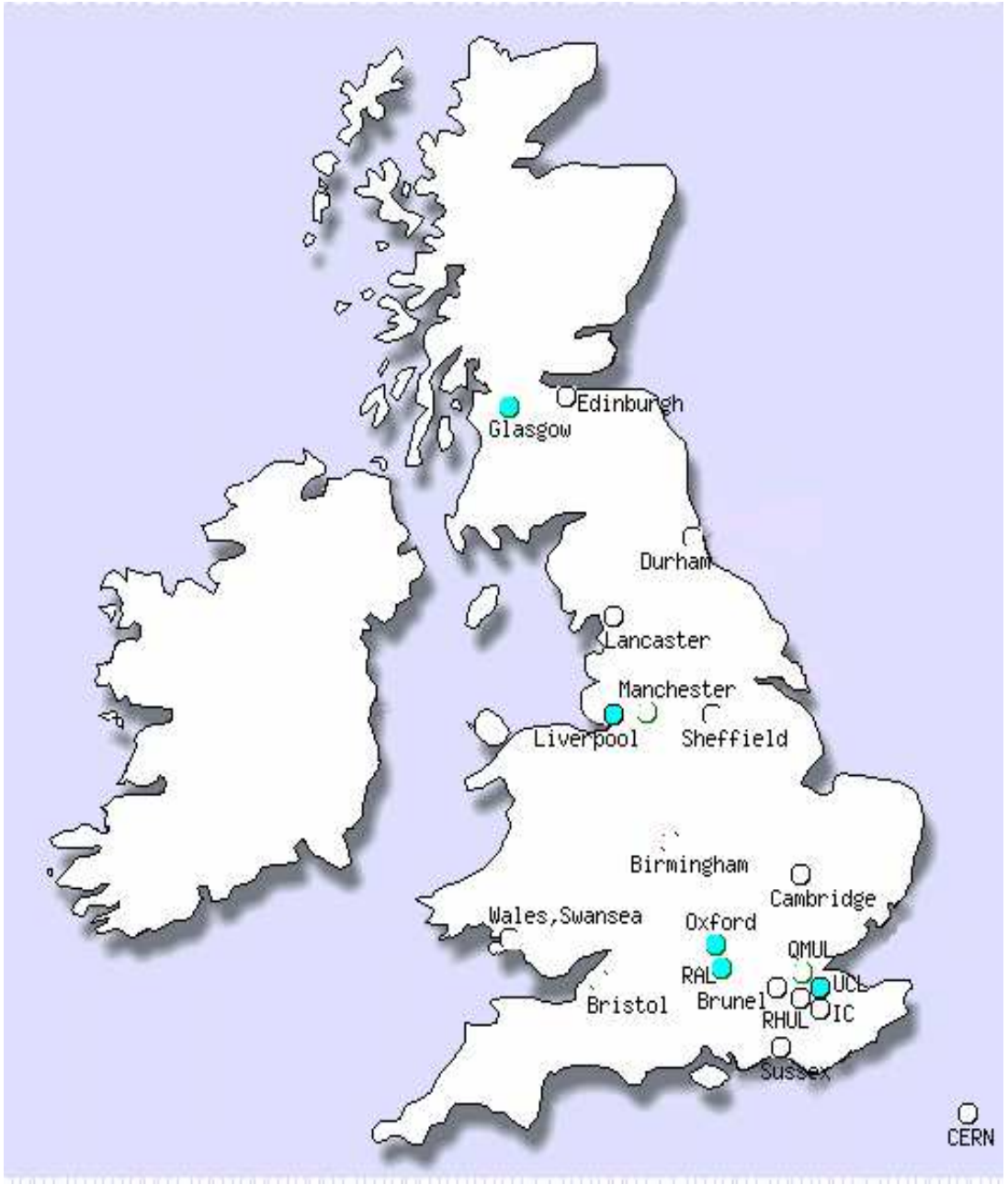

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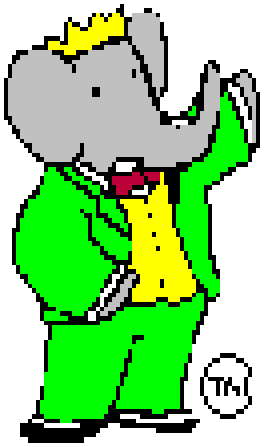
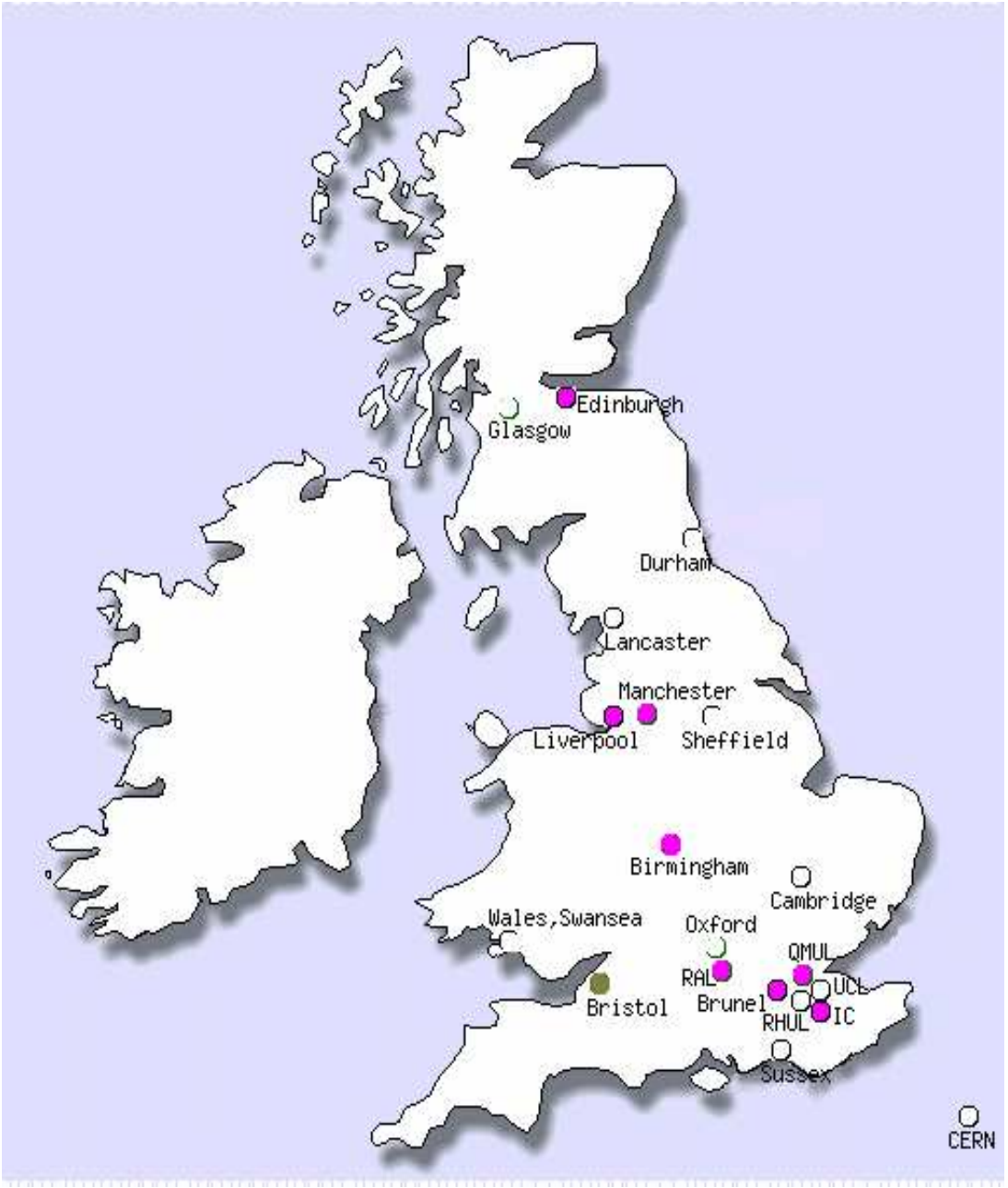




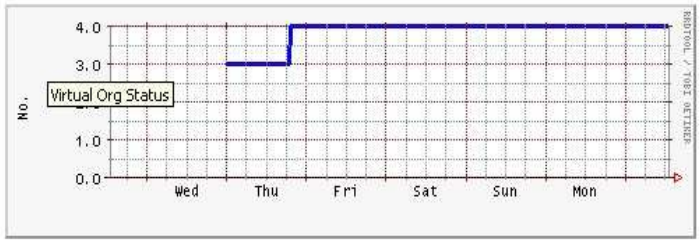
Experiment Grid Deployment

Current MDS Data from ldap://babargrid.phy.bris.ac.uk:21

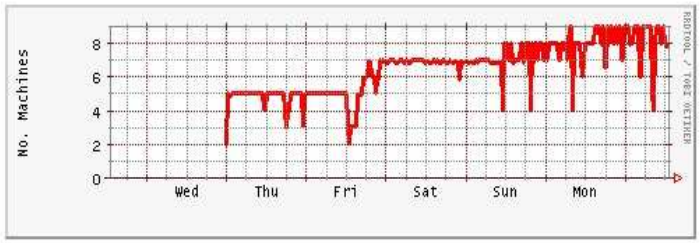
Total Statistics

	Simulation	Mixer	Reco	Total
Running	23	6	46	75
Pending	488	48	38	574
Total	511	54	84	649

Total Number of VO's Online



Total Number of Machines Online



Planned Testbed Use

- Testbeds
  - EDG testbed1, 2, 3
  - EDG development testbed,
  - DataTAG/GRIT/GLUE
  - LCG testbeds
  - other UK testbeds
- Data Challenges
  - Alice, Atlas, CMS, and LHCb confirmed they will use RAL
- Production
  - BaBar and others

Involvement in GRID MW projects

- EDG
- DataTAG
- BaBar Grid
- SAM
- Gaudi

EDG - UK Contributions

- Architecture
- Testbed-1
- Network Monitoring
- Certificates & Security
- Storage Element
- R-GMA
- LCFG
- MDS deployment
- FTREE
- GridSite
- SlashGrid
- Spitfire…

Summary

The UK has

- A grid in place
  - and expanding
- Staff contributing
  - in many fields
- Involvement in many Grids