Some comments on possible resources for LHCb computing, and some related activities

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Overview of presentation

- WG of national representatives and their mandate
- Overview of country situations (broad characteristics) for resource planning
- Some GRID related activities (UK Grid + ‘HEP Applications’ for EU-GRID)
- Comment on tapes/disks and LHCb activities

LHCb national computing contacts

Brazil	P Colrain
CERN	J Harvey
France	A Tsaregorodtsev(Marseille)
Germany	M Schmelling(MPI Heid)
Italy	D Galli, U Marconi(Bologna)
Holland	M Merk(NIKHEF)
Poland	M Witek(Cracow)
Russia	I Belyaev(ITEP)
Spain	B.Adeva(Santiago),G.Gracia
Switzerland	P Bartalini(Lausanne)
UK	AHalley(Glasgow),TBowcock(Liverpool)

a) Follow what is going on in country for national LHC computing planning

b) Act as interface for mapping from overall experiment strategy

Overview of current situation

- DISCLAIMER Nothing is 'agreed' in the MOU sense (requires negotiations in collaboration and with funding agencies), but we have the following viewpoint

  - we are trying to apply 1/3,2/3 rule overall
  - Good candidates for regional centres are
    - Tier1 Lyon,INFN,RAL,Nikhef
    - Tier2 Liverpool,Glasgow/Edinburgh
  - Discussions going on
    - Russia (?Tier1 for all expts ? Networking)
    - Switzerland (? Tier2 centre for LHCb)
    - Germany (? LHCb use of a national centre)
  - Discussions just beginning
    - Spain (? Tier2 centres with Lyon as Tier1)
    - Poland
    - Brazil

Look at UK since planning /negotiations relatively advanced...

- Computing requirements for 2001-3 for UK/LHCb dominated by detector (RICH+VELO) construction + some trigger optimisation (physics background studies in general start late 2003 but some now)

	CPU(PC99)	STORAGE (TB)
2001	200-400	5-10
2002	200-400	5-10
2003	400-600	10-20

- Satisfied(?) by MAP(Liverpool) + JIF (all 4 LHC expts)
  - JIF proposal (know result late 2000)

	CPU(PC99)	STORAGE (TB)	+ networking enhancement
2001	830	25	
2002	1670	50	
2003	3100	125	

- Beyond 2003 - community hopes JIF scale grows to ?? (see GRID etc.)

Strategy for other LHCb countries

- Make case to funding agencies based on
  - Detector etc. studies 2001-2
  - Physics +trigger studies up to startup
  - By startup have facilities in place to match pro-rata requirement for whole expt (see experiment model)
  - Each country has its own constraints (financial, existing infrastructure,etc.) leading to different possibilities for Tier-1/2)
  - Get involved in GRID related activities as appropriate(?manpower)

REAL

Generates RAW 100 kB
reconstructs ESD 100 kB
AOD 20 kB
TAG ~100+ B
stores RAW+ESD+AOD+TAG

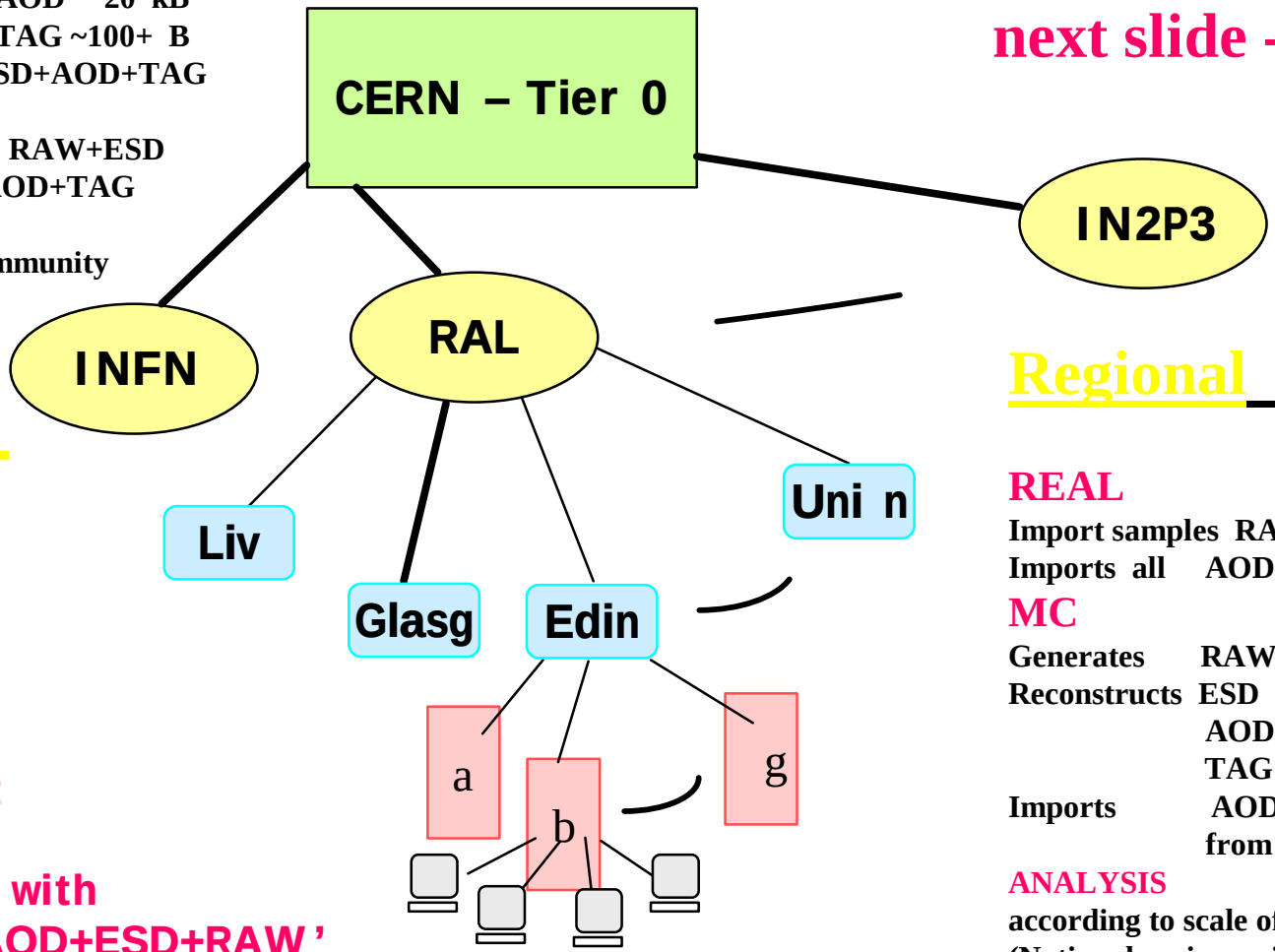
MC

Import samples RAW+ESD
Imports all AOD+TAG

ANALYSIS

For 'CERN' community

But we want a GRID not a hierachy, see next slide ---------



Tier 1

Tier2

Department Desktop

ANALYSIS with 'Ntuples +AOD+ESD+RAW' (105 ev take ~ 100 GB)**

Regional Centres

REAL

Import samples RAW+ESD
Imports all AOD+TAG

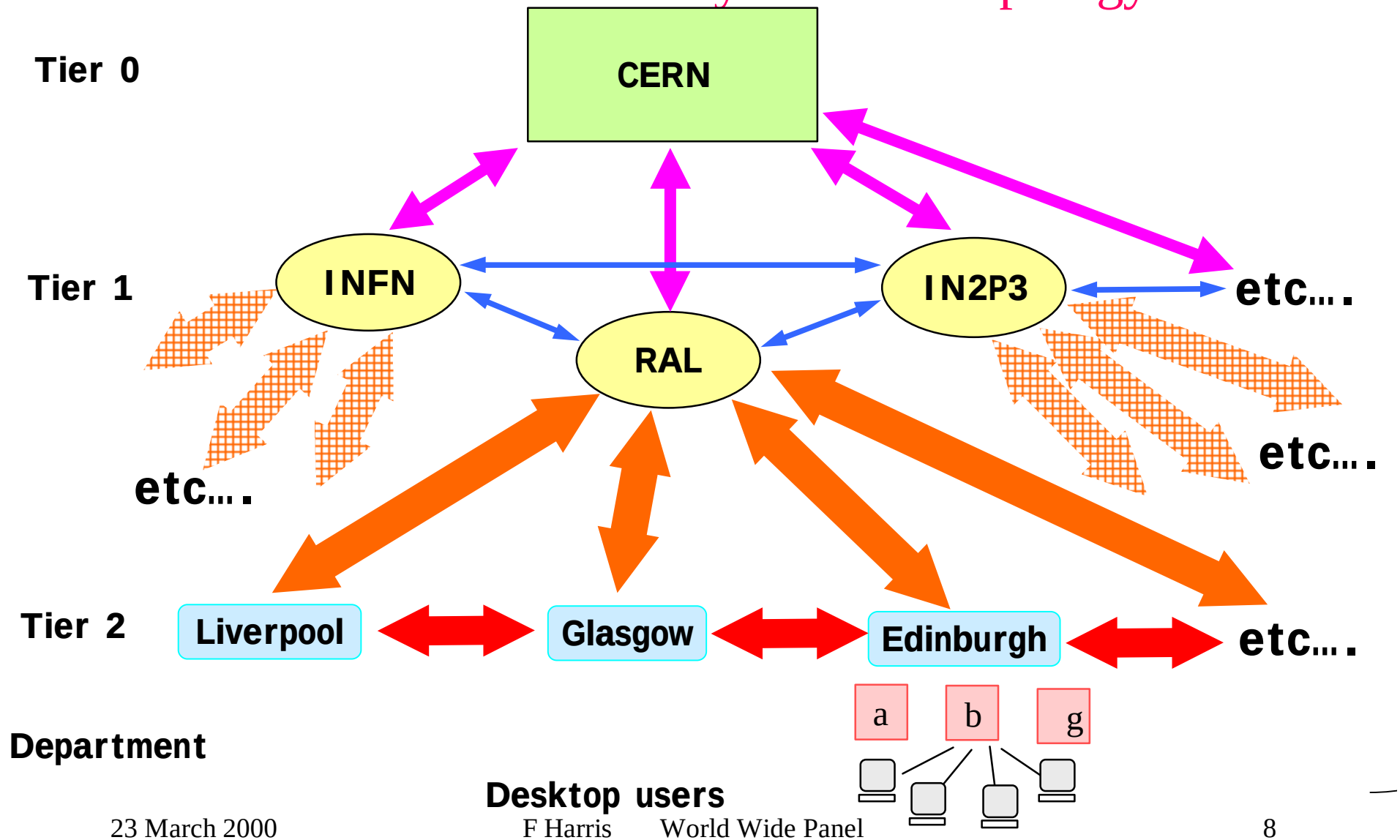
MC

Generates RAW 200 kB
Reconstructs ESD 100 kB
AOD 30 kB
TAG ~100+ B
Imports AOD+TAG from other centres

ANALYSIS

according to scale of centre (National,region,university)

More realistically - a Grid Topology



MAP (Monte Carlo Array Processor) Univ Liverpool

- *Status*
  - 300 Processors
  - All Processors tested
  - In production for about 6 weeks
  - produces about 240,000 LHCb events in 24 hrs (for VD related studies)
  - 10**7 events produced to date for LHCb VELO detector optimisation, and background studies (10**7 events take 10 TB of storage)
  - used by LHCb and ATLAS
- ***Current development activities***
  - Models for data analysis from remote sites
  - resource management/logging
  - production and management of large datasets
  - distributed data bases
  - COMPASS analysis stations (1 TB store)

- ***Mapping to the GRID***
  - Put this operation in GRID software framework ,linking to RAL and seeing functionality of sytem with farm producing MC data (raw + ESD +AOD) for accessing by physics analysis processing locally and at RAL
  - Will need new resources (networking,equipment,manpower)

Glasgow/Edinburgh proposal

- *Joint proposal by ATLAS/LHCb (prototyping studies - getting ready for LHC)*

  - MC Farm at Glasgow
  - Datastore at Edinburgh

  - Study data transfer and analysis over the same network link
  - Later hook to RAL Tier1 centre and later become part of GRID structure

  - Other interested parties

    - Edinburgh Parallel Computing Centre (data mining etc. with large data stores)
    - Astronomers (large sky surveys)

  - Uses for LHCb

    - MC studies Bs - Ds K, Bd,Bs - KK/K pi/pi pi channels

  - Major technical issues

    - Middleware (e.g. database and graphics software)

Thoughts on mass storage usage (see our note)

- We would like as much active data online on disk as possible
- Use tape for archiving ‘old’ data (? Some have suggested all disk systems- but how do you decide when/what to throw away)
- R/D - try strategy of moving job to the data (Liverpool COMPASS)
- ? If 2.5 Gb/s networks prove not to be affordable then we may need to move data by tape. Don’t want to do that if possible!