The Grid – challenging HPC infrastructure provision in Europe

Dr Mark Parsons

Commercial Director

EPCC and NeSC

m.parsons@epcc.ed.ac.uk

history

- EPCC has run major national systems for over a decade
  - 1990 Meiko Computing Surface
  - 1994 Cray T3D – 512 processors
  - 1997 Cray T3E – 344 processors
  - 2000 Sun E6800 – 56 processors
  - 2002 Sun E15000 – 52 processors
  - 2002 IBM p690 (HPCx) – 1280 processors

- we have also made these systems available on an ad-hoc basis to over 400 EU visitors since 1993 via our TRACS programme

TRACS – training and research in advanced computing systems

- funded by DG-RESEARCH
  - via Access to Research Infrastructure action of the Improving Human Potential Programme
- why training and not just access to systems?
  - long running debate with European Commission
  - funding not enough to buy large amount of access to HPC systems
  - systems not owned or paid for by EU – UK funding used to purchase them to benefit UK researchers
  - access made available from EPCC allocation on machines
  - generally a few % of total machine capacity
  - focussing on training allows us to give train people to use their own systems on return to their institute

HPC systems and the Grid

- large HPC systems are bought to
  - study problems infeasible on smaller systems
  - focus on major science and engineering challenges
  - they are not batch system replacements for workgroup servers
- access via the Grid poses many challenges
  - authentication and authorisation
  - accounting software is in its infancy
  - there is currently no way to “trade” cycles
  - security holes in rapidly changing software are a clear risk
  - etc etc
- ERA complicates things even further

- HPCx as an example:
  - UK taxpayer has purchased HPCx system for UK scientists to use and thereby to benefit UK economy
  - a German researcher wants to buy time on HPCx because his problem won't fit on his IBM p690 system – they offer cycles on their machine in return via the Grid
  - this is not a good deal for HPCx
    - system bought for large problems
    - users may not want their job migrated to German machine
  - alternatively money could be paid for cycles
    - again not a good deal
    - availability of machine has been reduced for UK researchers
    - what use is the money? – takes a long time to save for a node

ERA (continued)

- some thoughts
  - if EC is serious about ERA they have several options
  - purchase of HPC system for researchers from across Europe
    - realistic option – gives scientists in poorer countries access to enabling tools – surely what ERA is about
  - engagement with national procurement projects
    - for example at next UK procurement, EC could add 10% to total costs thereby buying 10% of machine for pan-European access
    - gives access to machine without harming national investment
    - UK researchers benefit by getting a machine 10% larger for 10% larger problems
    - costs would be around €7-10 million
  - national governments could work together to purchase a system for Europe

conclusions

- access to HPC resources over the Grid is big challenge
- issues go well beyond simple technical matters
- some issues go to heart of what we mean by *"European Research Area"*
- considerable concern voiced about what effect ERA will have on EU science
  - benefits need to be articulated much more clearly
- believe this can only be discussed/resolved at inter-governmental level