HPC SERVICE PROVISION FOR THE UK

5 SEPTEMBER 2016

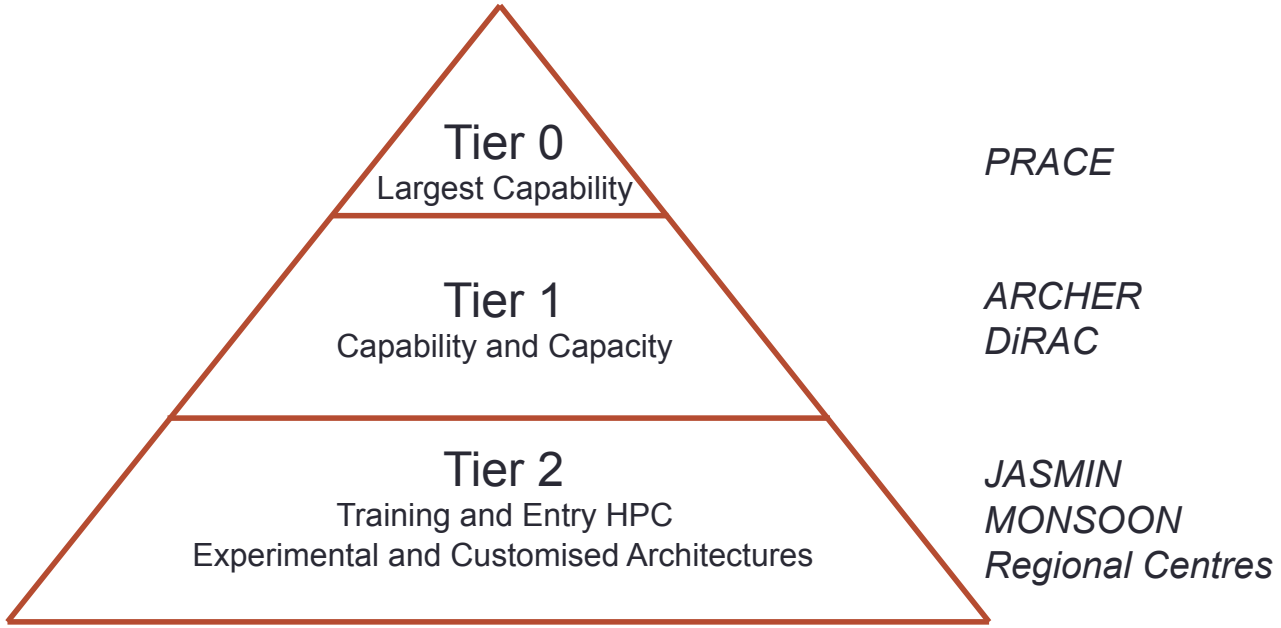
Dr Alan D Simpson

ARCHER CSE Director
EPCC Technical Director

Overview

- Tiers of HPC
- Tier 0
  - PRACE
- Tier 1
  - ARCHER
  - DiRAC
- Tier 2
  - EPCC
  - Oxford
  - Cambridge
  - UCL

Tiers of HPC



- Tiers of HPC --- from the largest capability machines to experimental and customised architectures
  - Adapted from “The Scientific Case for National High Performance Computing”

archer

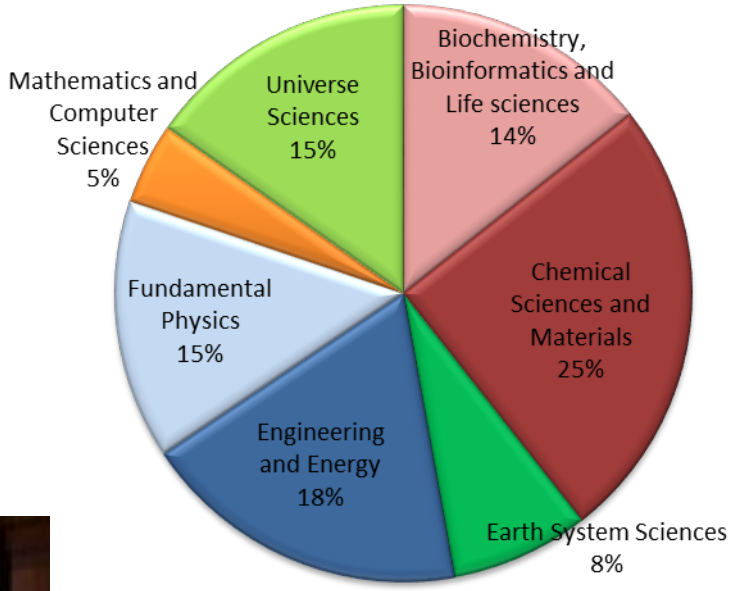
Tier 0: PRACE

- EU-funded pan-European HPC infrastructure
- EPCC leads UK activity within PRACE
  - Daresbury also involved
- The EPCC PRACE activity focuses on:
  - Applications enabling
  - Accelerator programming
  - Support for SMEs
  - Systems support
  - DECI access programme
  - PRACE Advanced Training Centre
  - Online training
- Opportunity for UK researchers to apply for time on Tier 0 (Preparatory Access / Project Access) and Tier 1 (DECI)

PRACE Tier 0 Systems

4 Hosting Members offering core hours on 6 world-class machines

MareNostrum: IBM
BSC, Barcelona, Spain



JUQUEEN: IBM
BlueGene/Q
GAUSS/FZJ
Jülich, Germany

SuperMUC: IBM
GAUSS/LRZ
Garching, Germany

Hazel Hen: Cray
GAUSS/HLRS,
Stuttgart, Germany

CURIE: Bull Bullx
GENCI/CEA
Bruyères-le-Châtel, France

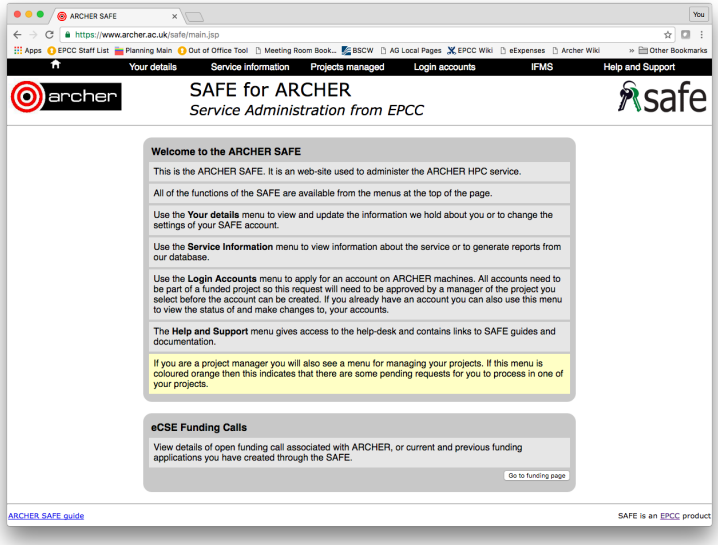
FERMI: IBM BlueGene/Q
CINECA , Bologna, Italy

Tier 1: ARCHER

- Funded by EPSRC and NERC
  - For materials chemistry, engineering, climate, …
- Service Provision
  - Accommodation, helpdesk, systems management, SAFE
- CSE Support
  - Training, in-depth support, code improvements (eCSE)
- Outreach
  - Outreach, diversity, engagement, impact
- Established, high quality ITIL processes
- Expecting ISO9001 certification within next few months

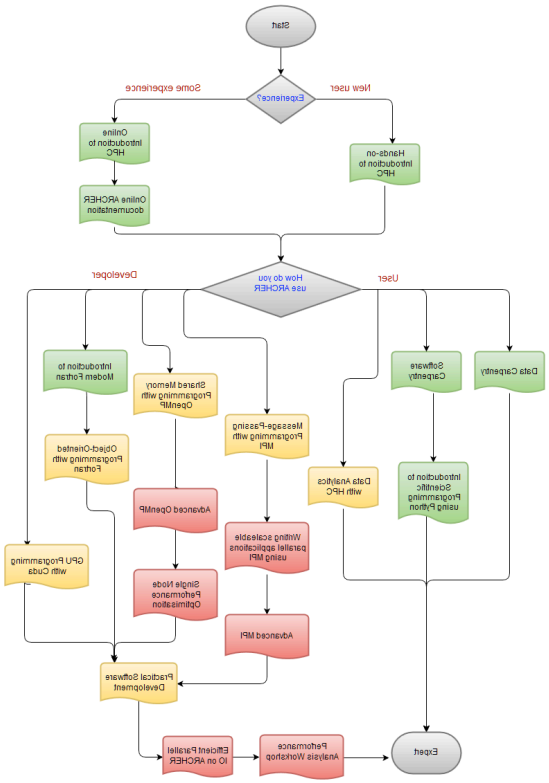
ARCHER SAFE

- Flexible system developed by EPCC over 10+ years
- Provides web portal for administration of HPC services
  - User registration
  - Standard self-service requests
  - Helpdesk
  - Resource allocation
  - Accounting and report generation
- Also supports:
  - Innovative analyses of usage patterns
  - eCSE application and review process, …
- More about this later today from SAFE's principal architect



ARCHER CSE Support

- eCSE programme (see tomorrow)
  - Includes 70% of the total CSE funding
  - i.e., 840 person-months
- Training
  - 72 days of training per annum distributed throughout UK
    - Based on user requests and demographics
  - Training programme approved by external training panel
    - Including representatives from regional centres and PRACE
  - Augmented by online training and virtual tutorials
    - Online Driving Test allows ARCHER access (more tomorrow)
- Consortium Contacts for all EPSRC and NERC Consortia
- In-depth science and technical support



archer

ARCHER In-Depth Support

- Core activity is answering challenging technical queries
  - Plus Technical Assessments for proposals
- Other recent activities
  - Managing heavy workload
    - Options paper re optimising job throughput when ARCHER is busy
    - Analyses of impact of changes to job priority formula
  - Proposal for possible updated benchmarks
    - Submitted to EPSRC and to be discussed with Consortia Chairs
- Current strategic priorities
  - Parallel I/O performance
  - Application usage landscape
  - Future processor/memory technologies
  - Plus continuous performance monitoring, user-level containers, autotuning frameworks, uncertainty quantification

ARCHER XC40 KNL System

- EPSRC and Cray have recently signed an agreement to add an XC40 Xeon Phi Development system to ARCHER
- 12-nodes of Knights Landing (KNL)
- Very similar environment to main ARCHER system
  - Including Aries interconnect and Cray tools
  - So users should enjoy a straightforward transition
- Timescales
  - System shipped in second half of September
  - Plan for user availability in mid-October
- Support will be available from helpdesk, Cray CoE, and via the eCSE Calls

Tier 1: DiRAC

- Funded by STFC for astronomy and particle physics
- Variety of architectures distributed across UK
  - Data Analytic Cluster (Cambridge)
  - COSMOS Shared Memory Service (Cambridge)
  - Data Centric Cluster (Durham)
  - Blue Gene/Q MPP (Edinburgh)
  - Complexity Cluster (Leicester)
- Technical Working Group to share best practice
- EPCC runs a centralised helpdesk for general enquiries
- Centralised SAFE for tracking and reporting usage

Tier 2

- Centres distributed throughout the UK
- Variety of different architectures
  - GPU
  - KNL
  - ARM
  - X86
- Centres can be focussed on:
  - Applications domain, novel architecture, region,…
- EPSRC have recently been selecting sites via £20M Call

EPCC Tier 2

- Proposal for regional HPC service
- Extending EPCC's recently purchased SGI ICE AX system
  - Around 10,000 cores for Tier 2
- Plus additional capacity on Research Data Facility for Tier 2
- Significant staff effort for: SAFE development and support; performance programming; helpdesk and systems support; industrial business development; data services;…

- To ensure success of Tier 2, it is vital that the Tier 2 centres are coordinated and have strong links to Tier 1 (and Tier 3)

EPCC Tier 2: Key Elements

- SAFE provision across Tier 2
  - Coherent interface for users across Tier 2 and Tier 1
  - Tailoring for local systems
- Data services on RDF
  - Data services for complex workflows both for users of EPCC's system and for users across Tier 2
- Sharing of resources
  - Exchange of resources to provide free access on Tier 2 on a juste retour basis
- Coordinated access
  - Access coordinated by a UK-wide Tier 2 Access Committee

http://www.archer.ac.uk
support@archer.ac.uk