



BRINGING HPC TO EVERYONE

ARCHER, OUTREACH, ENGAGEMENT & DIVERSITY

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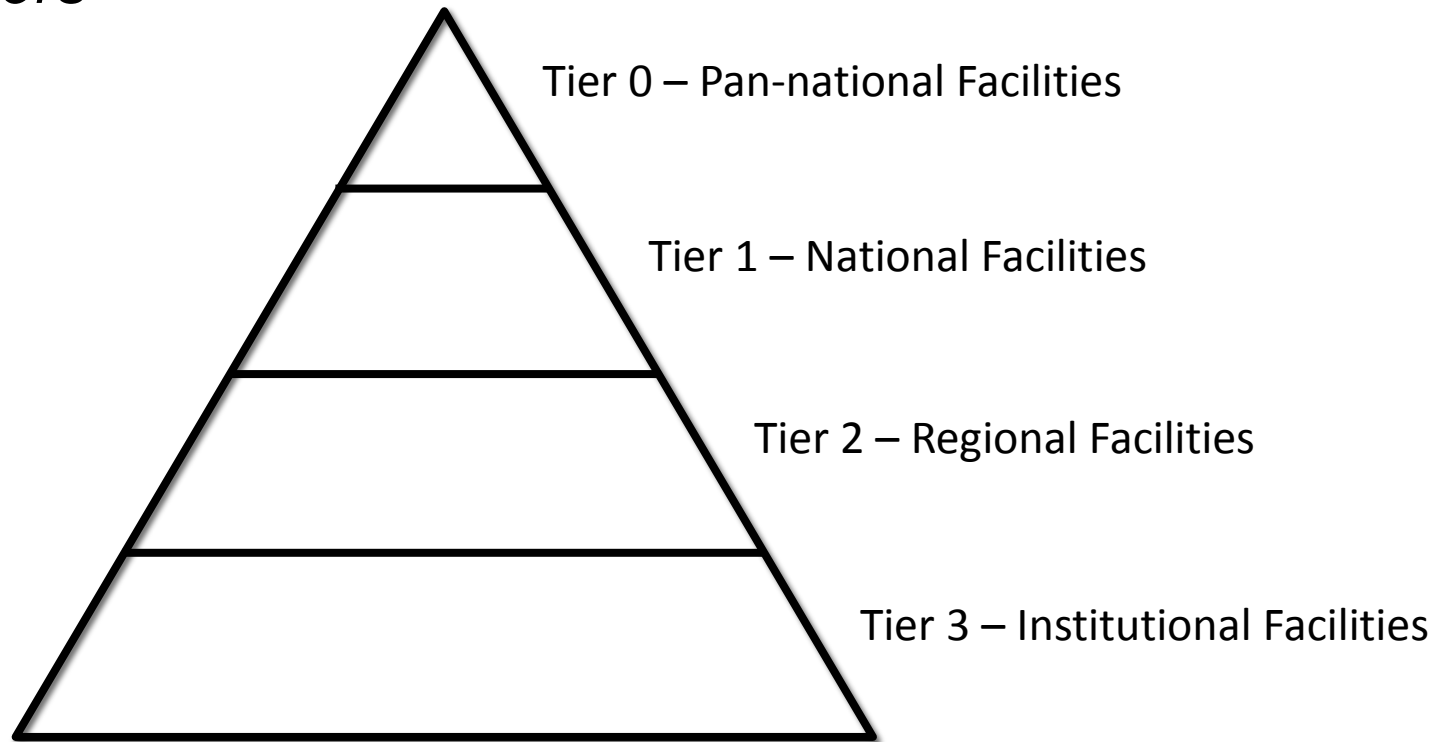
ARCHER: UK National Supercomputing Service

- Cray XC30 Hardware
- Intel Ivy Bridge processors: 64 (or 128) GB memory; 24 cores per node
- 4920 nodes (118,080 cores) each running CNL (Compute Node Linux)
- Linked by Cray Aries interconnect (dragonfly topology)

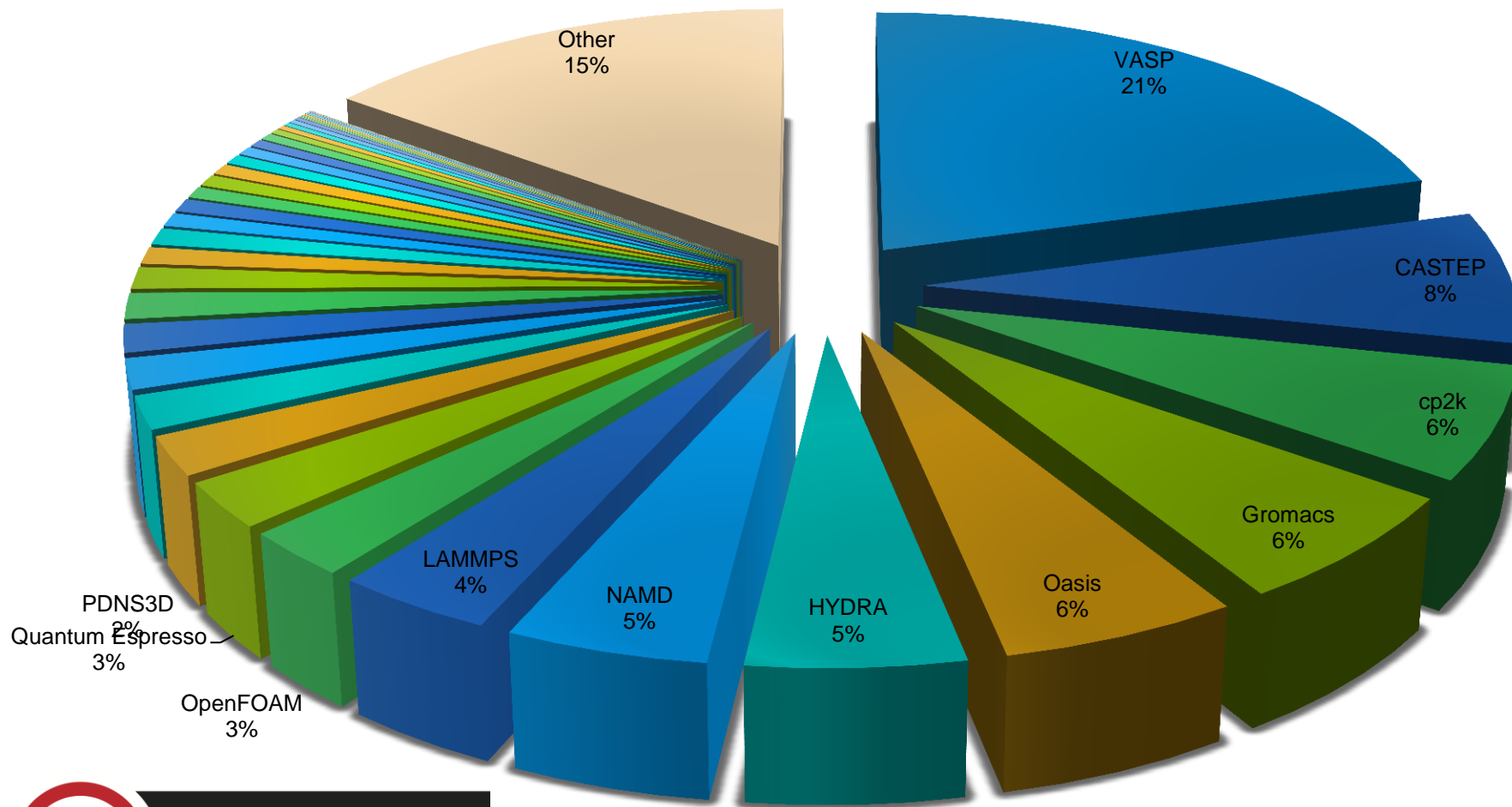


HPC Facility Tiers

- HPC facilities are often spoken about as belonging to *Tiers*



ARCHER Code Usage



Why do we need to 'bring HPC to everyone'?

- Everyone should be given an opportunity irrespective of who they are
- Diverse teams = better team IQ
 - Mixed gender teams are beneficial for output, productivity, improved publication rate and impact of research
- Recruitment
 - Europe: expects 900,000 IT sector job shortfall by 2020
 - US Dept of Labor: 19% increase in computer scientists in workforce is needed between 2010 and 2020
 - Canada needs additional 182,000 IT positions
 - Women are 51% of the population: to exclude them massively limits your potential talent recruitment pool
- HPC will gradually increase in percentage usage of the IT sector, requiring an ever increasing workforce



Women in IT today

- UK workforce: 31 million people, of which around half (47%) are women¹
- 1.18m IT specialists working in the UK during 2014, of which just 17% (199,000) were women²
- 2004-2014: proportion of women has stayed relatively static (18% in 2004 to 16% in 2014)²
 - Number of female IT specialists working in the UK rose by 19% (31,000 people): double the rate for female workers as a whole over this period (10%) and nearly two and a half times the rate for all UK workers (8%).
 - At the same time, a still higher rate of growth in the number of males working in IT positions (28%) means the relative shares of IT professional employment have remained almost unchanged.



1. Office for National Statistics (ONS) quarterly Labour Force Survey (LFS) 2014
2. BCS Women Scorecard 2015

What is the problem?

Its complicated!

- School age education
 - Girls drop out of STEM related disciplines earlier than boys
 - Stereotyping & peer pressure
- Undergraduate degrees (HESA 2014/15):
 - Women are more likely to study subjects allied to Medicine (81%), Veterinary Science (75%) and Agriculture & Related Subjects (63%)
 - Men are more likely to study subjects including Engineering & Technology (86%), Computer Science (83%) and Architecture, Building & Planning (66%)
- Job sector
 - Young women often leave computer science/related disciplines or terminate their training earlier than men
 - Women are less likely to progress in their careers than men

ARCHER Outreach

The ARCHER Outreach project (EPSRC grant EP/N006321/1) aims to promote HPC through engaging new, promote diversity and to engage the next generation

- Engagement
 - Champions
 - Engage new users and communities
- Impact
 - Build impact case studies on the importance of HPC for science and beyond
- Outreach
 - Engage the next generation
- Diversity
 - Improve engagement from under-represented groups
 - WHPC



Engaging the next generation of supercomputer users

- ‘Traditional’ outreach activities to the general public (adults and children) are a core part of our activities.
- A small team based in Edinburgh can’t reach everyone!

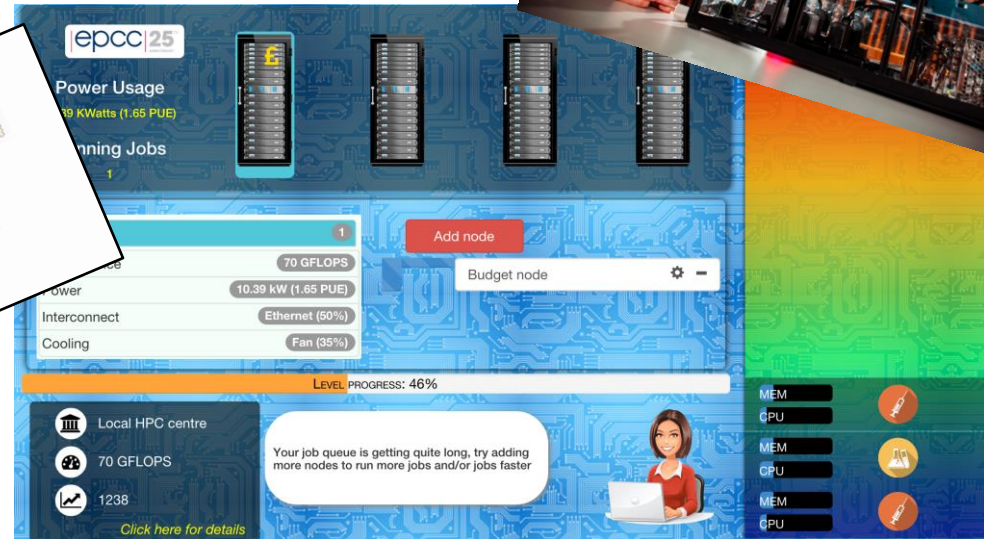
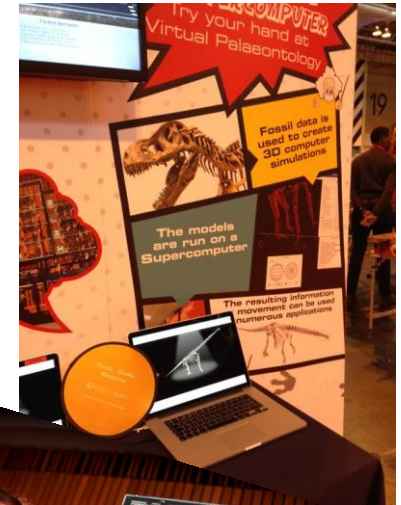
How do you reach and engage with an entire generation?



The Big Bang

UK Young Scientists & Engineers Fair

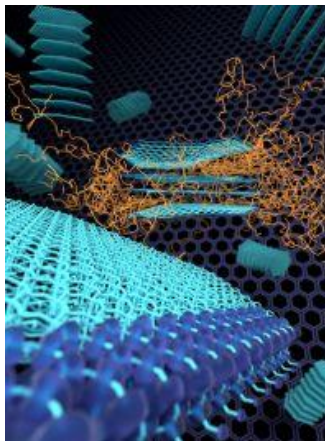
- Annual celebration of STEM for young people
- Over 70,000 visitors over 4 days at NEC
- Primarily 7-19 year olds



Outreach Ambassadors



- A program to encourage the UK HPC community to engage in outreach
- Minimise the barriers to getting involved in outreach activities
 - Provide pre-packaged activities to download and training
 - Designed to be cheap to implement with clear educational outcomes
- Encourage HPC users to consider talking about supercomputers and HPC at outreach events in addition to their science

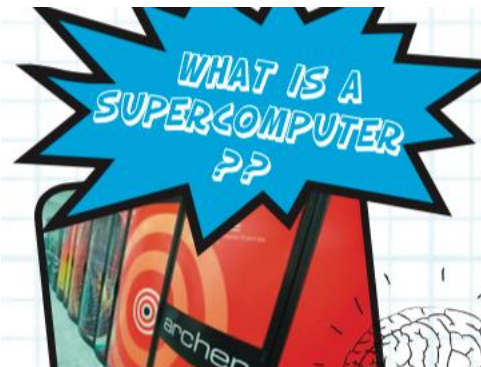


Outreach activities

- Post sorting: *how the post office uses sorting algorithms*
- Towers of Hanoi: *what is an algorithm*
- Design a Supercomputer: *an online game designing and running a supercomputer*
- Wee Archlet: *instructions for building your own Wee ARCHIE*

And much more:

Colouring sheets, Wee ARCHIE, Ball sorting, Dinosaur racing and designing aerofoils (CFD)



The ARCHER Outreach Project - Diversity

- A new website promoting diversity in HPC
- Faces of HPC: Career case studies
- Best practise guides
 - Training (broadening diversity by adapting training)
 - Improving conference accessibility
- Women in HPC workshops at ISC, SC and in the UK
- Modify training material to broaden participation



How do we attract a diverse set of HPC users?

Faces of HPC:

www.diversity-in-hpc.ac.uk/faces-of-hpc



Faces of HPC

Celebrating diversity in the High Performance Computing community.

If you are interested in being interviewed please email us at: info@hpc-diversity.ac.uk ^{en}.



Jesmin Jahan Tithi

Jesmin Jahan Tithi is an HPC Software Architect at the Platform Architecture and Performance Team at Intel Corporation. Jesmin previously completed a Ph.D. on "Engineering and high performance parallel algorithms with applications to bioinformatics" at Stony Brook University, New York, USA. [Find out more...](#)



Ida Rhodes

Ida Rhodes is considered one of the UNIVAC 1 pioneers. She helped develop the C-10 language, used in programming the UNIVAC 1 for the census bureau, and is also well known for her groundbreaking work on computer translations of natural languages. [Find out more...](#)



Katherine Johnson

Katherine Coleman Goble Johnson is a mathematician who worked at NASA for 30 years, contributing to the early application of digital electronic computers and space missions, such as calculating the trajectory for Project Mercury and Apollo 11. [Find out more...](#)



Margaret Hamilton

Margaret Hamilton was a NASA software engineer who worked on programming code for most of the Apollo missions' software. During the landing procedure for the Apollo 11 mission, it was her code that allowed the on-board computer to process which tasks were of greatest importance, saving the moon landing. [Find out more...](#)



Ada Lovelace

Ada Lovelace, a prodigy of mathematics and logic, is credited as the first computer programmer. Her work with Charles Babbage on the Analytical Engine would produce designs for a computer, and a detailed account of how to code it, almost a century before the first machine was built. [Find out more...](#)



Gavin Pringle

Gavin works at EPCC at the University of Edinburgh as an Applications Consultant. Some of his current projects include ARCHER's Computational Science and Engineering support team, managing the FORTISSIMO User Support Helpdesk, and working with the Software Sustainability Institute. [Find out more...](#)



WOMEN IN HIGH PERFORMANCE COMPUTING

Changing the face of HPC
www.womeninhpc.org



WHPC: What we do

Our vision

- Educate and collaborate with the HPC community
- Encourage participation by providing knowledge, fellowship, and support to women and the organizations that employ them.

How

- Raising awareness that gender-balancing research groups improves scientific output
- Highlighting best practices by institutions that have achieved gender-balance in HPC
- Increasing the visibility of female role models
- Providing opportunities for networking
- Discussing how to balance careers with other commitments
- Providing workshops for women in HPC



Get Involved!

Join:

- Free individual membership
- Non-profit/organisational membership: become a WHPC partner organisation and setup a local chapter
- Corporate membership

Engage:

- Follow us on social media
- Blog: read and contribute
- Participate:
 - Women in HPC at SC16
 - Workshop
 - BoFs
 - Celebration
 - Growing number of worldwide events

www.womeninhpc.org/membership



Thank you

www.archer.ac.uk

www.diversity-in-hpc.ac.uk

www.womeninhpc.org

support@archer.ac.uk

