Building the HPC community of tomorrow

CIUK 2021

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Why skills? What skills?

- The UKRI e-Infrastructure Roadmap highlights the need for increased numbers of skilled people to support the successful exploitation of HPC and AI in UK science and industry

- *Algorithms, Software & Skills* white paper (2019): "train a workforce in the skills needed to create digital products and services to raise the level of core programming and data handling skills across the research community"
  - Calls for new computational infrastructure must be accompanied by proportionate investment in skilled specialists.

- Critical shortages of RSEs, ResOps, DevOps, SysAdmins, Data Stewards

- Create the right incentives and environment to attract the best talent to the UK
  - Establish career pathways for skilled technical staff

Diverse science workflows require heterogenous architectures

Extreme Scaling "Tursa" (Edinburgh)

- Nvidia A100-based system
- large lattice-QCD simulations

Data Intensive "DIaL" and "CSD3" (Leicester & Cambridge)

Heterogeneous architecture to support complex simulation and modelling workflows

Memory Intensive "COSMA8" (Durham)
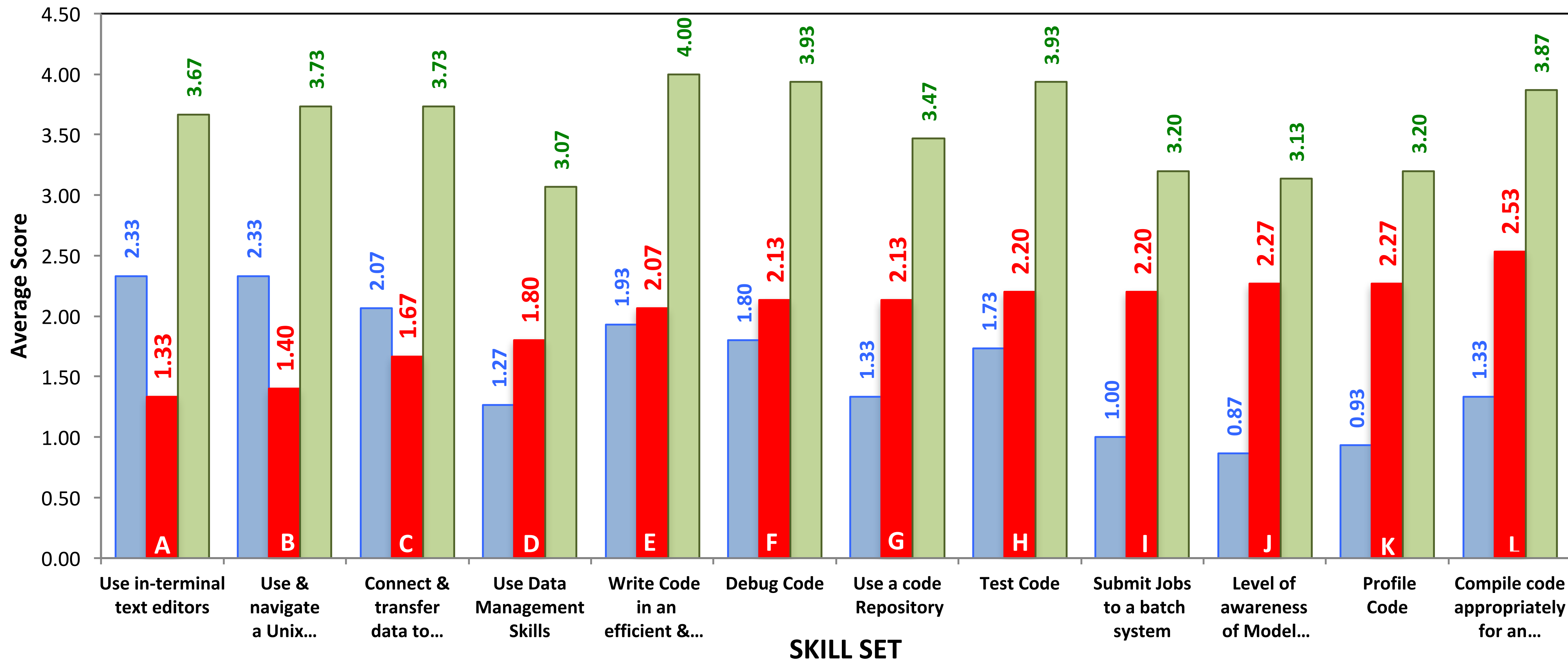
360 TB RAM to support largest cosmological simulations

Identifying training needs and skills gaps

DiRAC PI Survey Results for User Skill-Set Requirements

DiRAC Essentials Programme

- DiRAC Essentials Level test ensures all users have base level of HPC skills

- Online (and compulsory!)

- DiRAC provides *access* to training from wide pool of providers

- Facility training goals:
  - maximise DiRAC science output through more efficient software
  - flexibility to adopt most cost-effective technologies
  - future-proofing our software and skills
  - contribute to increasing skills of wider UK economy

DiRAC Essentials Level Training

Unix Environment

Command Scripts

Version Control

Software Design

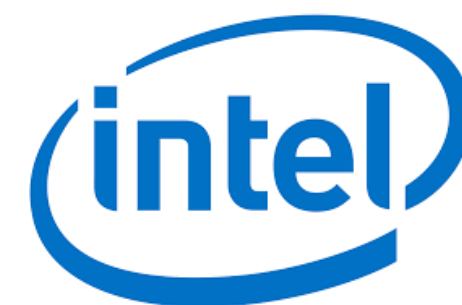Software Testing

Code Scaling

Good Network Practice

DiRAC Training Programme

- Training programme includes workshops: Software Design & Optimisation; MPI programming

- CodeCamps: Nvidia, Intel

- New in 2021: AI/ML workshops in collaboration with STFC SciML team

- Currently working with Software Sustainability Institute to develop bespoke training material in 2022

DiRAC Hackathon Programme

- Started in 2018 - success of first three events (Nvidia, Arm, Intel) has led to this becoming a core DiRAC innovation and training activity in support of the DiRAC science progamme.

- Benefits:
  - Provides insights into potential value of new technology for DiRAC services
  - Provides industry partners with feedback on new and future products
  - Enhances skills of users and technical staff through exposure to new technologies
  - Opportunity to improve performance of current codes on existing hardware

Innovation placements

- Key pillar of DiRAC training portfolio

- 6-month placements for PhD students and early-career PDRAs

- 12 placements supported to date

- 2021/22 opportunities:
  - DiRAC-3 partner funded: 3 placements
  - DiRAC Federation Project (UKRI Digital Research Infrastructure funding): ~10 placements
  - Ideas for partners and/or projects welcome
- Benefits include:
  - Bi-directional knowledge exchange
  - Enhanced employability
  - Experience of working in industrial environment
  - Skills development

Kickstart your HPC career

- The UKRI e-Infrastructure Roadmap highlighted the essential need for increased numbers of skilled people to support the successful exploitation of HPC and AI in UK science and industry

- CIUK 2020 featured the inaugural CIUK Student Cluster Challenge as a step towards addressing this need

  - Developing the next generation of HPC experts

  - Encouraging engagement with industry partners in innovation projects

- CIUK and committee recognised the importance of this initiative and were determined to ensure the competition proceeded in the virtual-only format for CIUK 2020.

- In 2022, we will be exploring how to expand the cluster challenge programme

Conclusions

- Training needs to be at the heart of the UKRI Digital Research Infrastructure

- DiRAC Innovation placements - closing date: 13th December, 4pm

- Watch out for details of the "Kickstart your HPC career" programme in 2022

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