

Wee Archie and Wee Archlet

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EPSRC

NERC SCIENCE OF THE ENVIRONMENT

archer

CRAY
THE SUPERCOMPUTER COMPANY

epcc



Why design Wee Archie?

- The ARCHER service has a programme of public engagement activities
 - Designed to encourage young people to gain an understanding of High Performance Computing, Computational Science and Programming
- Demonstrating parallel computing can be difficult
 - Lack of tangibility, relevance to the audience, perceived “complexity”
- Wee Archie is a suitcase-sized supercomputer
 - Designed to let school children try their hand at computing and learn about the benefits of supercomputing





What is Wee Archie?

- Wee Archie – a portable cluster composed of Raspberry Pi 2 computers
- Portable – designed to be moved from location to location
- Easy to setup – 5 minutes from box to running
- Safe – no moving parts, no exposed connections
- Visually stimulating – clear paneling exposes the connections and LEDs to monitor activity
- Working – runs real (if scaled down) simulation code
- Low power consumption
 - Full event display mode max 80W
 - Benchmarking mode – 65W



Hardware

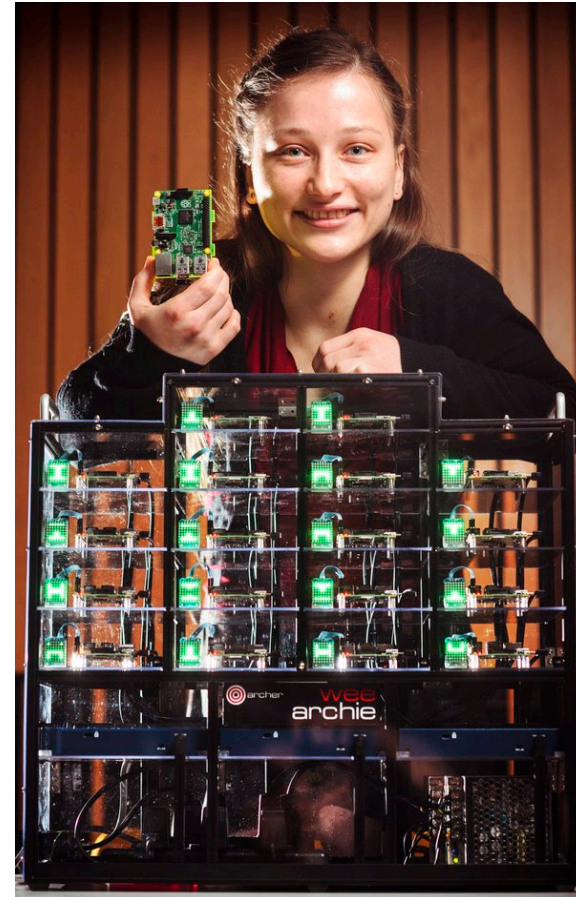
- 18 nodes, 72 cores, Raspberry Pi 2
 - 900 Mhz Quad Core ARM Cortex A7
 - 8x8 LED Matrix
 - 18GB RAM
- 10/100 Ethernet
- 208 GB storage
- Single power cable, single network cable to outside world
- USB Wi-fi adapter

- Custom housing design
 - each node has individual tray for easy removal for maintenance
 - power supply floorboard can be disconnected for maintenance
 - light weight extruded metal frame with transparent paneling



Software

- 18 nodes
 - 1 Monitoring and network server
 - 1 Master node with NFS server
 - 16 compute nodes (raspberry01-16)
- Base operating system: Raspbian 'Wheezy'
- Common install:
 - MPICH 3.0.4, GCC/GFORTRAN 4.8, Python 2/3



Wee Archie demos

- Dino-racer
 - The original demonstration allows users to 'modify' a dinosaur and race it
- Fractal generation
 - Demonstration of task farming to produce a fractal based on a simple MPI code
- Keep smells smelly
 - Shows the challenge of simulating large complex molecules but with a child friendly problem
 - Simulates the mouse major urinary protein (MUP) – or mouse wee
- LINPACK: 11.5-12.5 GFLOPS



New demos

- CFD wing simulation
 - CFD Fortran code to perform a 2D simulation of airflow on a wing cross section



- Weather simulation
 - Simulates the weather, can change various parameters and observe differences in performance



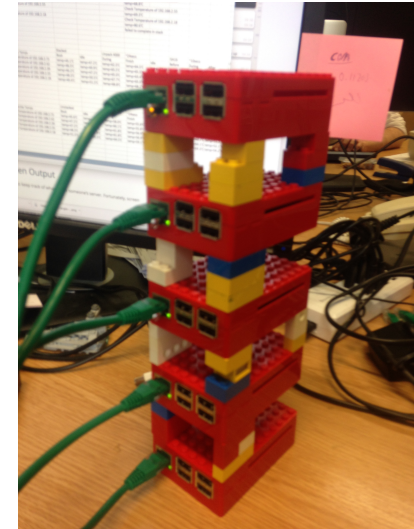
Wee Archie events

- The Big Bang Fair
 - Birmingham
 - Over 70,000 people attended
 - ~6000 people on our booth
- EISF
- Bang Goes the Borders
- Various school visits
- ISC
 - On the EPCC booth - showcasing the work to colleagues



Wee Archlet

- Wee Archlet
 - A small build your own cluster
 - Aimed at schools, coding clubs, youth groups
- The aim
 - To allow people to experiment and to encourage learning
 - Again remove the perceived “complexity”
 - To be fun
 - To support school curriculums in England, Northern Ireland, Scotland and Wales – technology, science and computing
- What do you need:
 - Some Raspberry Pi computers, a network switch, a desktop or laptop



Wee Archlet prototype

- This prototype:
 - 5x Raspberry Pi 3
 - 1 Network switch
 - 1 USB multiblock
 - 5x “Lego” Cases
- Preliminary testing of Wee Archlet
 - Total Spec: 20 cores (1.2Ghz), 5 GB RAM, 40 GB storage, 10/100 Ethernet
- Instructions are currently being developed and will be tested with a couple of volunteer groups before being released to all



Outreach Activities beyond Wee Archie

- Build your own Supercomputing game
- Post sort, ball sort, etc
- Colouring sheets, word searches etc

- Ambassador pack being developed
 - Pack contains information and resources for ARCHER users to visit local schools
 - You don't need a Wee Archie to do an outreach event
 - Supercomputer game runs on a laptop/tablet, post sort can be run with envelopes and stickers
 - Small budget for ambassadors for travel e.g. train fairs



Conclusions

- Wee Archie and Wee Archlet
 - Designed to support our programme of public engagement activities
 - Provides a hands on experience
- Wee Archie is visually engaging and has been to a number of events
- Wee Archlet is a build your own system
 - Can be built by groups in schools, youth groups etc
- Both Wee Archie and Wee Archlet are present today



Many thanks

- Alistair Grant, Gordon Gibb, Nick Brown
- The outreach team
- Clair Barrass and Neelofer Banglawala who are demonstrating Wee Archie today

