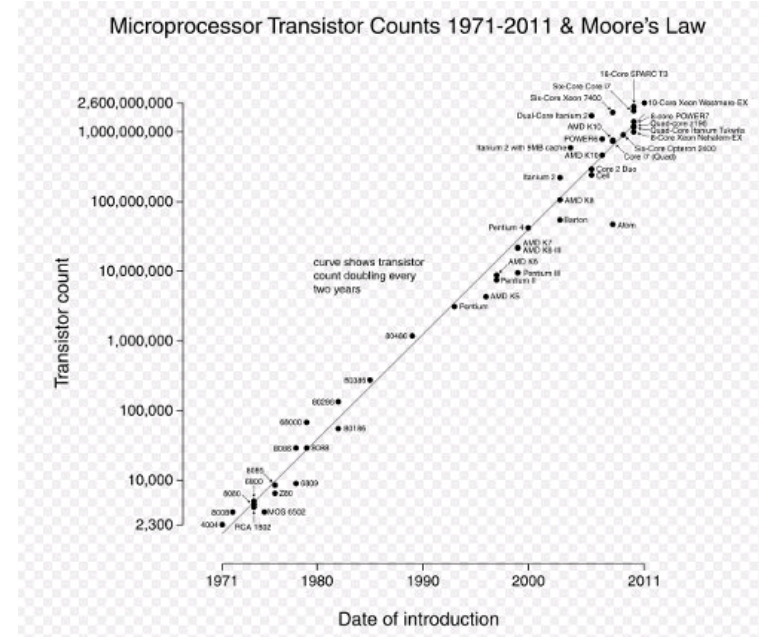# Workshop on Advanced Computing for Accelerators
Day 3

Roger Barlow

Computers get faster
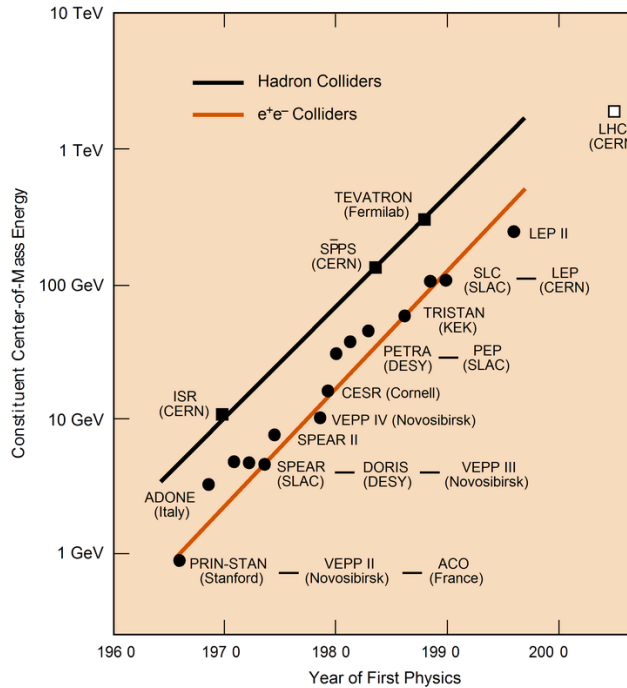
Livingston Plot

Moore's Law

So?

Most of us spend most of our time with computers

- We can do calculations more quickly
- We can do different calculations
- We can use calculations in a different way
- These can change our whole approach to the way we plan and work

Provided we are prepared to learn to use new tools, not just stick with familiar desktops and laptops.

Different 'Parallel' Architectures

Many Cores
Not connected
(Condor)

Many Cores
linked
(Beowulf)

Many Cores
On 1 chip
(MIC)

Many specially
configured
Cores
(GPU)

Different Problems

Independent
identical
particles/cells

Independent
different
particles/cells

Connected
particles/cells

Dependent
steps

Need to match…

Day 1: What we can do now

Existing packages GENESIS and VSIM (formerly VORPAL) implemented on Hartree HPC cluster
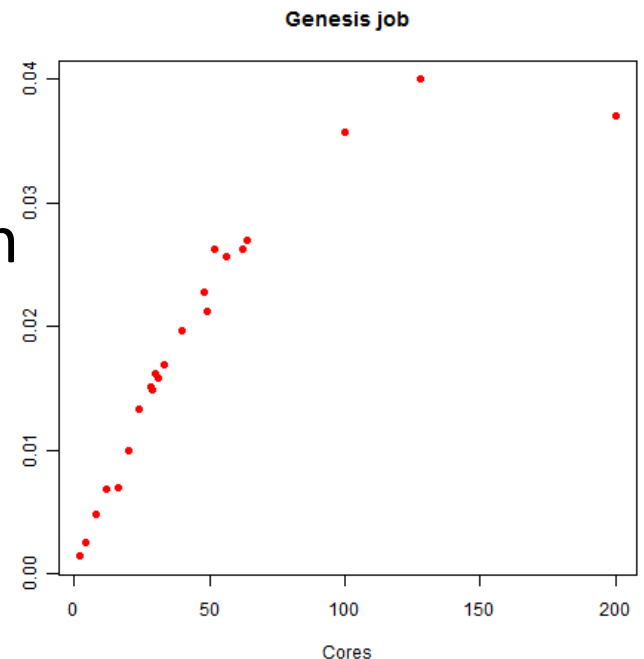
(Also GPT available: ELEGANT available soon)

Thanks to David, Jonny, Bas and Peter, and to support from Rob and other Hartree centre people.

First use of training centre.

~45 people have now used HPC

Graph shows speed up I obtained on GENESIS job from using many cores

Impressive to get 2400 CPU sec job back in < 1 minute

Genesis job

Day 2: Learning from others

Very broad range of talks. My personal impressions…

- Cores are there, and begging to be exploited
- Writing new code is more successful than parallelising old code
- Gains to be made at low level (linear algebra)
- GPUs are very specific. Hard to adapt to our purposes
- Multicore node architecture (Xeon Phi) looks very nice
- Condor Pools are unconvincing
- openMP /multicore beats MPI/message passing
- Genetic optimisation/Pareto fronts are becoming standard

But specific purposes need specific tools - Condor, GPUs, rewrites may be the right answer to some questions

Day 3: Making things happen

Most important day…

Personal plans for the way our work is going to go in future

Collaborations/projects forming between people here

Proposals for funding to EPSRC, STFC, etc