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Computing in HEP at the time of the Grid

R.Brun, F.Carminati, G.Galli Carminati (eds.)

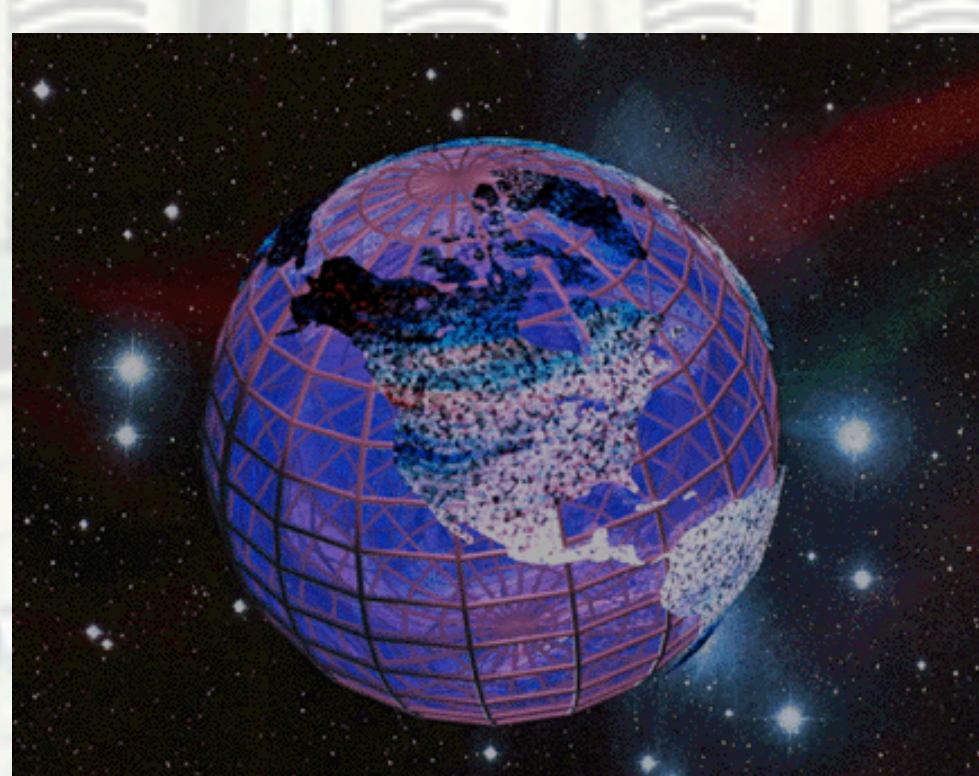
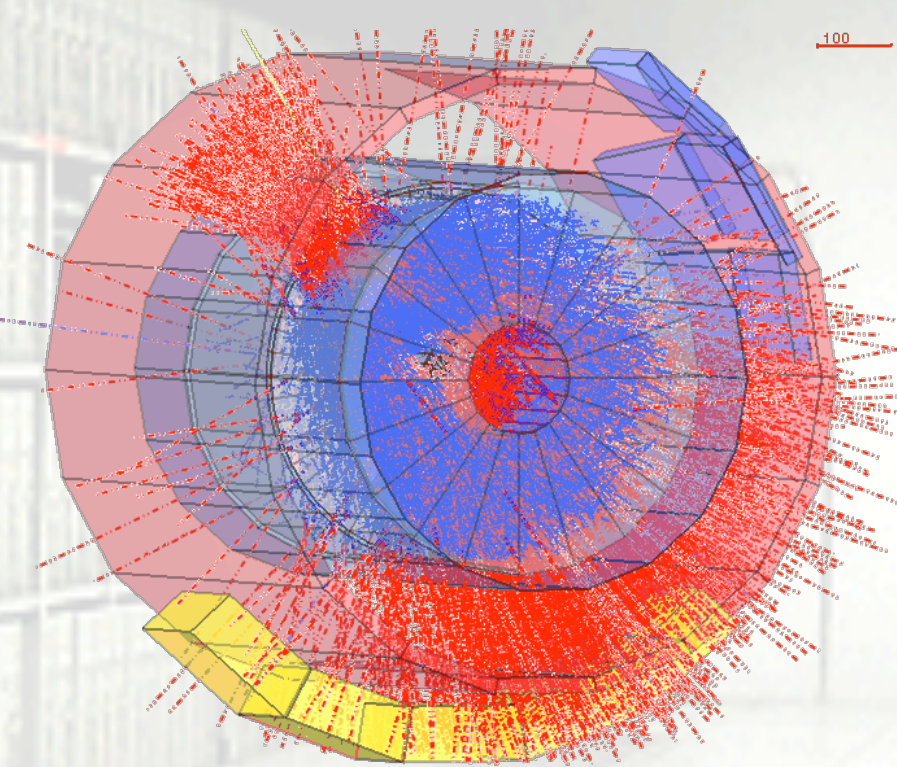


[...]During all these years HEP computing has faced the challenge of software development by distributed communities, and of exploiting geographically distributed computing resources. HEP computing has been very successful in fulfilling its mandate [...]
For many aspects, HEP computing has been today where computing was going to be tomorrow. This book describes the evolution of HEP computing, and in particular those aspects that have been most innovative.

20 years of HEP computing (R.Brun, CERN)

The impressive changes in the HEP software in the past 10 years have required a big effort of adaptation from thousands of users. The trend towards larger and larger applications will continue to grow. This will require more discipline to organize the application in a set of libraries that can be dynamically configurable such that the running code in memory is a small fraction of the total code.

[...] A large fraction of the software for the next decade is already in place or shaping up. Core Software requires Open Source and international cooperation to guarantee stability and smooth evolution. Parallelism will become a key parameter. More effort must be invested in software quality, training and education.



Why HEP Invented the Web ? (B.Segal, CERN)

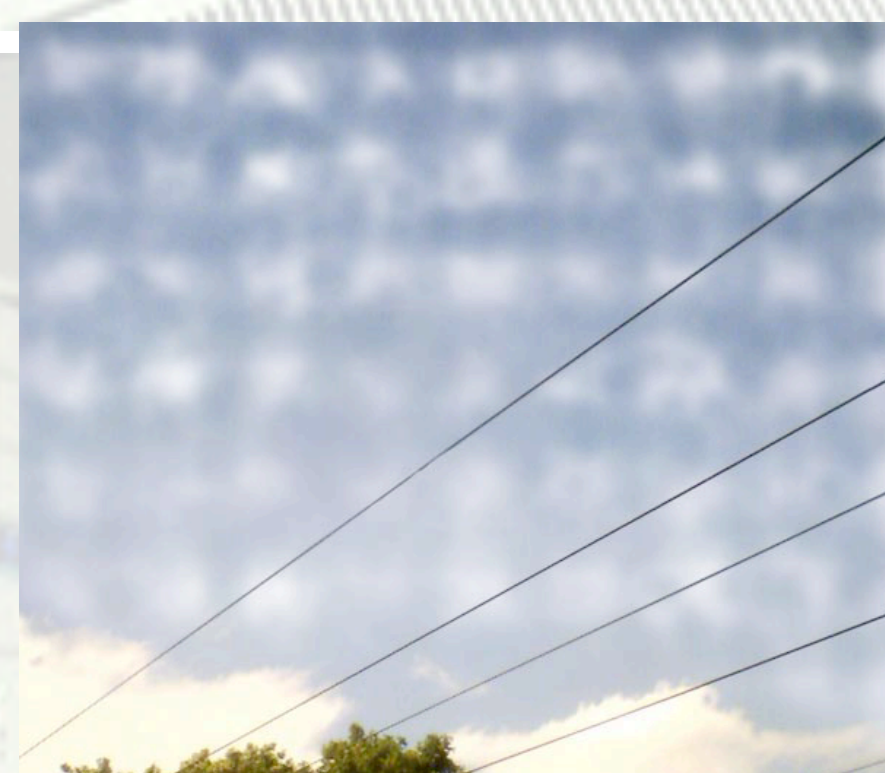
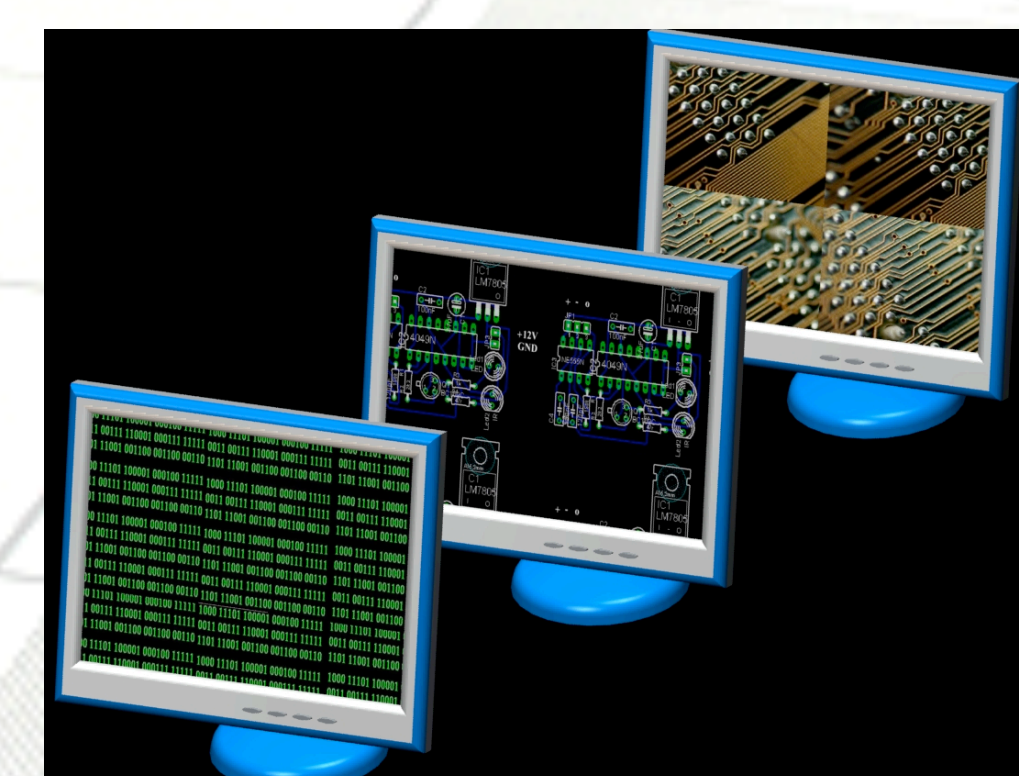
In fact one man, Tim Berners-Lee, invented the Web, not “HEP”. So our question should really be re-phrased as: “What was the influence of HEP in leading to the Web’s invention?”

The Web’s invention, like many other such leaps, was in fact “coincidental”. It was certainly not ordered, planned or anticipated in any way by “HEP”, by CERN, or by TB-L’s programme of work there. But for that particular leap to occur, a certain number of pre-conditions were essential and all these existed at that time at CERN. What were these essential items ?

Software Development in HEP (F.Carminati, CERN)

In spite of its rather honourable record, HEP [computing] has never claimed to use, nor has it used on a large scale, traditional Software Engineering methods [...]

However, some intuitive Software Engineering was applied without ever being formalised. Some of it was quite innovative, and indeed ahead of its time. The failure to recognise this led to a complicated and not very efficient relationship with Software Engineering and software engineers, that still continues today.



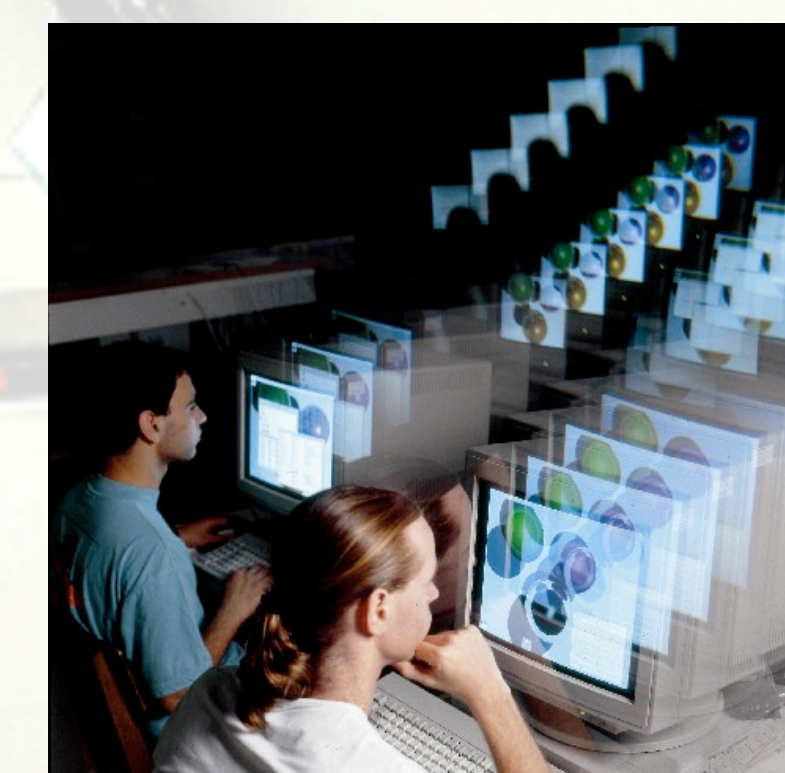
Virtualisation in GRID computing (P.Buncic, CERN)

The virtualisation technology also opens a possibility for Virtual Organisations and even individual users to create ad-hoc, overlay Grids capable of efficiently running specific applications by deploying a pool of virtual machines on top of physical hardware resources. In doing so, they would create a virtual Grid or virtual cluster which would have a much smaller scale of physical Grid [...]
This could give Virtual Organisations and users a complete freedom of choice when it comes to selecting the middleware that is best suited for their applications while enhancing security on the resource owner’s side by completely isolating user application while running on the site resources.

Evolution of Parallel Computing in HEP (F.Rademakers, CERN)

Computing in HEP has always required more computing power than could be provided by a single machine. [...] In this context, the idea of using a group of CPUs or computers in parallel to increase the combined CPU, memory and disk available to a program, is only natural. In addition, in HEP data processing events [...]

A problem that can be easily parallelized in large chunks is called embarrassingly parallel and most HEP processing falls in that category. In theory running an embarrassingly parallel program on multiple machines looks fairly trivial, but the practice is much more complicated.



Aspects of Internet Law for HEP Software Developers (L.Pinsky, University of Houston)

Let’s begin with the concept of property. Normally when we think of property, we think of tangible things like your laptop, or maybe the land your home is on.

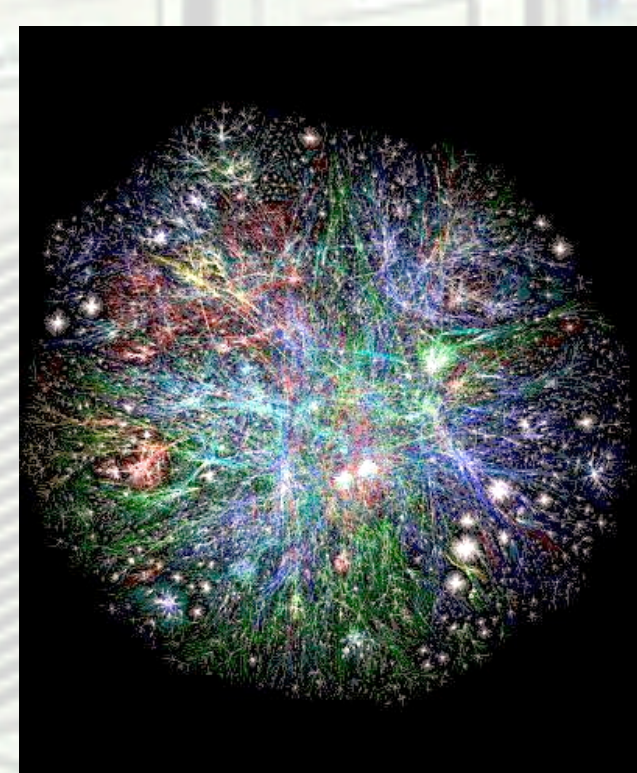
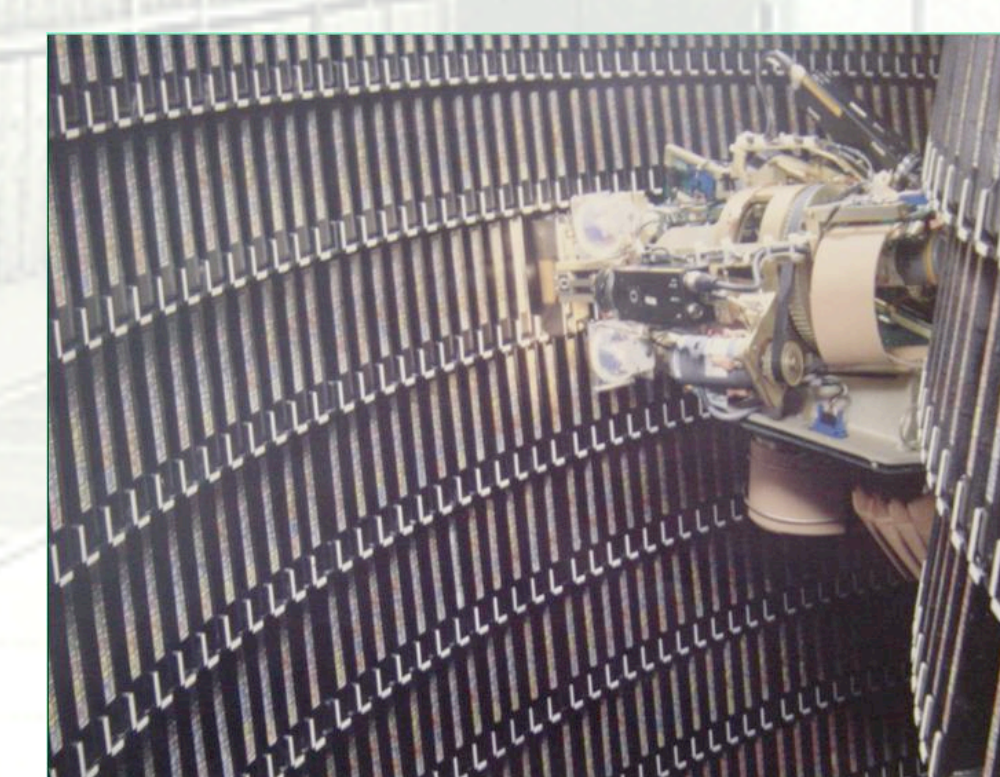
How does all of this work when the property in question is intangible, like an idea? How does one own an idea?

[...]Intellectual Property (IP) is intangible, but nonetheless can possess almost the same bundle of rights that tangible property can.

Databases in High Energy Physics (J.Shiers, CERN)

There is no doubt that the era described above was at times turbulent — both the move to distributed computing and from “Fortran to OO” resulted in heated debates and often diametrically opposed opinions.

We have not yet gained sufficient experience in this environment for a fully objective analysis — this must wait another few years, including the onslaught of full LHC data taking and analysis.



The planetary brain (G.Galli Carminati, HUG, Geneva University)

- Can we describe our brain as a “thinking machine” ?
- Can a theory of the brain as a thinking machine explain, or instruct us about, the evolution of global connection ?
- Are thoughts physical objects ? Are thoughts matter ?
- Are the elements of the WWW and the GRID and their interconnections evolving toward a planetary brain ?