Software developed by researchers at the University of Cambridge’s Computer Laboratory has helped transform the way companies handle their computing needs, as well as improving the efficiency and security of servers and reducing energy usage.

EPSRC-funded research at the Computer Laboratory produced a piece of ground-breaking, highly successful software. Called Xen, it makes a single computer appear to be many similar, but smaller, computers. Each virtual machine can run any operating system and any applications. It means several people can use the same server without being able to affect each other’s personal virtual machine and without being aware of each other.

**IMPACT ON GLOBAL INDUSTRY AND RESEARCH**

- **Xen** was instrumental in the development of cloud computing which has revolutionised how companies undertake large computing jobs.
- This work helped to generate a company that was worth $500m when it was sold in 2007 to Citrix, a US company.
- Researchers around the world have used Xen to develop further research and generate new applications.

**Cloud computing**

The notion of getting the most out of the least number of servers initially attracted companies that handled large amounts of data like Wall Street banks which traditionally had hundreds of thousands of servers. The next generation is cloud computing in which users rent time on someone else’s virtual servers without having to buy their own machines.

Amazon uses the Xen software in one of the largest cloud computing bases. “Amazon’s data centre is a bunker containing tens of thousands of servers running Xen,” says researcher Steven Hand. “Anyone can reserve a slice of one machine – a virtual machine – on an hourly basis.”

Cloud computing can also help reduce the computing industry’s carbon footprint as a data centre using virtual machines uses less energy.

**Spin-off sold**

The team set up a company called Xensource in 2005 to develop Xen commercially and this was bought in 2007 by US company Citrix for $500m. One reason Citrix was attracted to virtualisation was security, says Steven Hand. “Citrix’s existing customers were mainly large banks, law firms and healthcare operations where security was essential. Virtualisation provides an extra layer of security; even if one user’s operating system is infected with a virus, only that virtual machine is affected, and the rest of the system remains virus-free.”

The Cambridge team still has links with Xensource and is working with Citrix to apply virtualisation technology to other computing environments. Steven Hand: “The market has now moved downstream from big companies with lots of servers to smaller enterprises. We’d like to open Xen up to individual users on their laptops or mobile phones.”

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PREDICTED YEARLY GLOBAL MARKET BY 2013