

**While open source dominates the software industry, open source hardware is only just starting. Rob Buckley looks at Sun's attempts to start a new market**

# The Bright SPARC

Open source and the GPL have revolutionised the software industry. Code is less buggy, prices are lower and vendor lock-in is becoming a thing of the past. But so far, few hardware companies have tried to bring the philosophy of open source to their components. While many use open source software such as Linux to run their hardware, few use open source methods to create the hardware in the first place. Now that's changing, thanks to Sun Microsystems.

Sun has been late in coming to the open source party. While its competitor, IBM, saw the future before many other big companies and jumped on the open source bandwagon, Sun tarried. It made excuses about where Linux and open source were appropriate, developed its own licences as alternatives to the GPL and refused to open source many important systems. After a slow adoption of Linux in its product line and seeing dwindling sales, Sun eventually bit the bullet and opened the source of its crown jewels', the operating system Solaris.

Just like IBM, Sun has always been both a hardware and a software company. But although IBM stole the lead in the software arena, this time, Sun has beaten IBM to the punch. In December, it leapt into the world of open source hardware before almost everyone else and promised to release the source code to its UltraSPARC T1, as well as an accompanying verification suite and simulation models. Sun has called the project OpenSPARC.

Simon Phipps, chief open source officer at Sun, says the inspiration for the move comes from the co-operative advantages open source gives. "We've come into a connected age where we think trying to develop large systems in isolation is probably going to be much less successful than trying to create large systems in collaboration with everyone who wants to join in the activity."

But how do you open source a piece of hardware? Modern microprocessor designs are now created using a language called Verilog. Each chip design consists of many lines of Verilog code, which means it's possible to release the instructions for any new microprocessor under a software licence. If the licence is a free licence, anyone can inspect the code, suggest improvements and incorporate it into their own hardware, assuming they have the facilities.

Phipps expects, as with many open source projects, that the main OpenSPARC developers will be other semiconductor companies, but there may be others as well. "People who contribute to the SPARC design are going to be a different category of developer. But we expect a diverse array of communities around the world will pick the code up and contribute it back. I'm already getting emails from people at universities

who are excited to see SPARC designs being made available like this. It's becoming the subject of research and university courses. People outside of semi-conductor companies are using it." Nevertheless, Phipps says 5-10% of the industry - "a reasonably large global population" - are already sniffing around it.

Unlike with many projects, however, he doesn't expect there to be a central repository of OpenSPARC designs to which everyone will contribute. Instead, the company's own designs will act as reference code. Each company that's interested in using OpenSPARC code in their own designs will download the OpenSPARC instructions, work on them and incorporate their own technology into the instructions. When the chip is finally ready and in production, the company will then publish the source code under the terms of the GPL. Other companies will then be able to

use that technology in their work, and so on.

Phipps said the company thought "deeply" about what licence to use for the OpenSPARC project. "We've picked the best licence for the job. Of the options available, the GPL licence is the most likely to help people

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understand the true openness of what we are doing. The family of licences like BSD or Apache are very suitable for projects where people are willing to take responsibility for licensing and distribution. There's a family of licences built around Mozilla for forming close-knit communities around a single codebase. The GPL is a licence that's useful when you want to make code widely available, want to do something on a global scale and want to make it widely used."

The hardware business is, of course, very different from the software business. Revenues and patents, while controversial in the software world, are almost universally accepted in the hardware business as a just reward for the millions spent on innovation in engineering. The GPL, however, is incompatible with patents, stipulating that it may not be used as a licence unless any patented technology is licensed to users for free.

However, Sun has gone to some lengths to square that particular circle. "If companies out there want to use OpenSPARC code and they have patents, they can't use that code under GPL. But they can come to us and negotiate separate licences with us. The GPL will help us to get patent worries off the table. Obviously, we're not going to allow a hostile patent behaviour to express itself in the community."

Sun has also transferred all the intellectual property incorporated into OpenSPARC chip designs into a new body, SPARC International. It now has to license the SPARC design from SPARC International just like everyone else - for a nominal administrative fee that's covered by the GPL's clause on

charging for source code. "It's a tiny payment that keeps their administration ticking over. It's not a great big portfolio licensing that were engaging in."

How much effort Sun is putting into OpenSPARC isn't clear. While Phipps points out that Sunil Joshi, one of Sun's vice presidents and a leading light in the semi-conductor design community, is heading up the initiative and is "dedicated to making it work", Sun hasn't wowed everyone with the speed of its implementation. The first OpenSPARC-based chip, the UltraSPARC T1, is already being used in T1000 and T2000 servers, yet the actual source code the whole OpenSPARC project depends upon wasn't available at the time of writing, three months after the initial announcement of the OpenSPARC project; Phipps didn't expect it to be available for another two months.

Sun is also backing away from IBM's approach to raising developer interest, by avoiding partner programmes. "IBM haven't gone open source [like us]. They've done creative but traditional partner programmes. Look at Power.org: it looks remarkably like a partner programme to me. This is not a partner programme. This is genuinely releasing source code under the GPL." Nevertheless, Sun is clearly hoping that by harnessing the power of open source, it will be able to increase worldwide support for the SPARC chip, which is usually associated with the word "beleaguered". It is also going for adoption in both server and embedded markets.

To many, the OpenSPARC chip may look massively over-spec'ed for the embedded market: it has eight cores, each capable of executing four threads, and is more clearly aimed at servers. Yet, the SPARC chip is used in digital cameras from both Sun and Fujitsu among others, since the increasing image processing requirements of consumer gadgets are requiring similarly powerful chips. The low power consumption of the OpenSPARC chip also makes it desirable for use in portable gadgets. While an UltraSPARC T1 might well be overkill for some applications, the nature of open source means potential manufacturers can re-purpose the chip and remove anything they don't need.

"The characteristics of open source are such that I have no idea what people are going to do with the code", says Phipps. "We've already seen the community porting Solaris to PowerPC and Debian Linux to

use the Solaris kernel rather than Linux. I wouldn't have predicted either of those. But I anticipate people will find a way of embedding SPARC chips." The main hope for OpenSPARC is a revival of SPARC in servers. In particular, Sun hopes that the open source community will be willing to migrate Linux over to OpenSPARC, and has made public the Hypervisor API for the OpenSPARC design, so multiple operating systems will be able to run at the same time. Sun COO Jonathan Schwartz says "Linux on SPARC is dead serious. I'm personally talking to leaders in the community. BSD, too."

However, industry observers such as analyst Nathan Brookwood of Insight 64 are not so sure of the likely success of Sun's move into open source hardware. "I really think it might appeal to some researchers. It's really hard for me to imagine that a serious manufacturer would go off and make a product out of it." Similarly, Illuminata analyst Jonathan Eunice says, "The time for Linux on SPARC as any kind of major market phenomenon has come and gone - over five years ago now, maybe longer. It just serves to split the available development resources." The reaction of Linux vendors has been equally cool. Novell says it has no plans for a SuSE Linux port, having stopped building it on SPARC after version 7.3 due to reduced customer demand. Red Hat also has no plans to port either Red Hat Enterprise Linux or Fedora to OpenSPARC.

Hardware vendors have yet to be persuaded as well. Michael Hjalsted, Unisys EMEA marketing director for servers, said Sun's initiative was unlikely to sway it from Intel chips. "Multi-core is the way forward for chips, but Sun is going to be a niche player. It'll need ISVs to support it. Our main focus has been Microsoft, with open source coming in over the last 24 months. However, its going to be a major change to go down the SPARC solution [route] and at the moment, I can't see any reason to, particularly without the backing of Novell or Red Hat."

Sun's opening of SPARC's source is a brave attempt to use the power of open source to regain market share. It is creating an entirely new market, one which is perhaps unlikely to succeed, particularly with the might of Intel and IBM to face. Still, that's what people said about Linux and Microsoft ten years ago.



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