How Moore's Law drove Intel into the arms of anthropologists

By Jon Stokes | Last updated 2 days ago

MOUNTAIN VIEW — Intel CTO Justin Rattner took the stage at Intel's annual Research Day to host what was something of a launch party for Intel's new Interaction and Experience Research Lab—essentially a place to put all of the anthropologists and ethnographers that the company has been hiring over the past decade, and also a very high-profile validation of the value that the chipmaker places on the work of these folks.

Rattner also took up the topic of Atom vs. Xeon for cloud computing in a later Q&A session, and his response to my question of what he thought about SeaMicro's 512-Atom server might surprise you.

The power wall (again)

I got a chance to chat with the lab's director, Intel Fellow Genevieve Bell (to my knowledge the first and only Intel Fellow who's a social scientist), and with some of the lab's researchers. Longtime Ars readers know that for some years I've been fascinated with what Intel's turn toward ethnography says about the evolution of the computing industry and of the company's business model. It's clear that Intel is now extremely serious about moving even further into consumer products—and the dominant factor in the company's move into consumer products and its use of ethnographers to generate product ideas is none other than our old friend Moore's Law.

For the first decades of Intel's processor business, the answer to the question of "what's next" was fairly obvious: some combination of faster processors, cheaper storage, and more system bandwidth.

But, by the close of the 1990s, two things happened within Intel. First, one small corner of the company hired a handful of cognitive psychologists and other social science types to start thinking about the future of the PC as it moved from the business into the home. The second development was that Intel began to see a looming barrier to the steady stream of process-driven clockspeed increases that had sustained the computing industry's performance growth in preceding years.

The impact of the first development was much slower to play out than that of the second. By 2001, Intel was talking publicly about the "power wall" and about turning the company away from a reliance on clockspeed increases and toward the as-yet unproven multicore computing model. As is widely known and oft-lamented, the problem with a sudden shift to multicore was that the software industry wasn't ready for the move to higher levels of parallelism (and it still isn't ready).

So we've muddled through so far, and while we've been muddling through, something else has happened: the arrival of the first x86 SoCs.

From theory to practice: GoogleTV

At this past IDF, Intel began the full-court press to promote its Moorestown SoC platform as a solution for handhelds. The company also talked more about SoCs, and about the fact that it wants to start making more highly integrated platforms out of flexible building blocks.

Now, the SoC business has fragmented into three main parts: 1) OEM customers, who design consumer products and put in orders for SoCs with specific kinds of capabilities, 2) fabless semiconductor shops, which work with a range of OEMs to make SoCs that fit certain market niches, and 3) the foundries, which manufacture the SoCs that are dreamed up by the first two parties.

Because Intel isn't an OEM customer, a fabless shop, or a foundry, it ends up having to be all three at once if it wants to play the SoC game. That's one place where the ethnographers come in.

The ethnographers essentially stand in for OEM devicemakers, in that they provide Intel with market-oriented input into the kinds of products that the company should be designing SoCs for. In other words, the user experience researchers can function as substitute "customers," so that Intel can iterate its products internally in conversation with a kind of "market."

The end result, as Rattner described it in the Q&A session at the end of the day, is a set of "reference experiences"—basically complete, market-ready products with everything up to and including the interface already designed by Intel and run internally through a product development process that includes ethnographers. These products are then labelled as "reference designs" and offered to what are essentially resellers, who can either take the whole thing, rebadge it, and go to market, or replace parts of it with some of their own engineering.

"In the more vertical markets, you find more companies who are not capable of developing their own experience, and are more willing to take either an experience that's coming from the silicon supplier or one from a third party," Rattner said.

The example that Rattner gave was GoogleTV, which was based on Intel's Smart TV platform. "In the case of Smart TV, we defined a complete user experience. Google looked at that experience and then replaced it with GoogleTV. Whereas in Europe, Orange saw it and liked it, and is taking the whole thing and going to market with that."

Intel plans to continue the approach they've taken with Smart TV, and Rattner told us that at any moment the company will have five or six user experience projects under way. In addition to Smart TV, the Intel Health Guide, and the ClassmatePC, Rattner named two other directions that Intel plans to take.

"We have smartphone activity in the labs right now. You haven't seen much of it publicly—just a few bits and pieces." He also said that "there's a good chance that the connected car that you see out on the floor will be part of the experience team."

Intel's social scientists have provided input into how all of these products function, based on their fieldwork.

About that Atom vs. Xeon cage match

At the end of the Q&A, I asked Rattner what he thought of SeaMicro's recent 512-Atom server announcement—not just the device itself, but what it represents as an approach.

Rattner immediately started laughing and wondering aloud how he could most safely answer the question without getting himself into trouble.

"The best instantiation of our thinking [on this issue] is out on the floor, the Single Chip Cloud Computer" (SCCC), he said.

"There's a growing body of evidence that suggests that for these massive datacenters there's a different optimum—a different set of tradeoffs—between performance and energy," he explained.

"I think what we have today are server architectures—not just processors but platform architectures—that have evolved from enterprise server architectures where there were maybe a few hundred servers, but not 100,000 or a million. When you start talking about server counts of that magnitude, the solutions look different."

Rattner went on to say that the research backs up the idea that large clusters of fairly weak processors can be "dramatically more efficient" on certain types of cloud workloads than traditional enterprise servers (of the kind that Intel currently sells hardware for), which is why the company is eager to get to market with either SCCC or something like it.

"We need to get these machines out there and into these production settings, to get a much better handle on their strengths and weaknesses. I think it's going to lead us to much higher core counts and much more energy efficient cores in those processors."

This was about as close to an outright validation of the "physicalization" trend as you're going to get from Intel, and given Rattner's response, it's clear that the company is moving full steam ahead in this direction. I'd look for more announcements in this area in the future, and I'd also say that this bodes very well for SeaMicro.