EdXact's Mathias Silvant

The team and adventure continue ...

by Peggy Aycinena

May 22, 2006

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Mathias Silvant has a PhD from Hanover University in Germany, but lives in Grenoble, France. Prior to his current role as President and CEO of the EDA start-up EdXact, he worked at Snaketech, which was acquired by Simplex, which was acquired by Cadence. Prior to that adventure, Mathias worked in consultancy for Infineon, Philips, and ZMD in Germany.

I spoke by phone with Mathias, from his offices in Grenoble in early May. It was late in the day for Mathias in Europe and early in the morning for me here in Silicon Valley.

I asked Mathias to give me the brief outline of the company's history. He told me, "EdXact is a company that was started in 2004 and is dedicated to parasitics analysis, especially model order reduction. Three of us started the company and we've grown since 2004 to have 13 employees, plus some external reps who sell our products. We've developed our first tools and have shipped them – we saw our first customers last year."

"We do have intense collaborations going on here with the University of Grenoble, but we're not located here because of that. We're here because most of the team was formed in 1999 to work for a startup called Snaketech. Snaketech was acquired by Simplex, and then by Cadence."

"For a while after that, all of us constituted the Cadence European R&D office here in Grenoble. But in 2003, Cadence needed to get slimmer and R&D in Europe was sacrificed. That really wasn't too bad for us, because we separated on very good terms with our former employer."

Mathias added that, in contrast to the typical story in North America after layoffs, the Snaketech-turned-Cadence group stayed close and continued to think as a unit: "Actually, there are 9 or 10 of us who have been together for a long time, through all of these various companies. In fact, most of the team at EdXact were part of Snaketech. Even two of the original founders of Snaketech, Michel and Philippe, are with us here at EdXact on our advisory board. It's really a good thing – we know each other very well and have a history together. The group is very close to being a family."

Clearly, the people involved have prevailed, but what happened to the

Snaketech technology at Cadence?

Mathias said, "The Snaketech technology included place and route, layout extraction, and substrate modeling; and they're actually still available from Cadence. They're now part of the Assura tool flows."

He quickly added, "Of course, our new company – EdXact – is not in conflict with Cadence, or anything going on there. We're very happy to be working on a topic here which is important to the community, but is additional and complementary to what is done in Cadence."

"There were a whole bunch of different tools coming out of Simplex at the time we were working on those Snaketech tools, and it was a good fit for us to be bought by Simplex to combine our technology with theirs. After we were purchased by Simplex, part of our team had the chance to work with the developers at Simplex on a new tool for RF, which is now part of the Cadence RF tool."

So if EdXact is also working in RF, do they see themselves as potential competitors to the Agilent RF offerings?

Mathias said no, not at all: "We are complementary to what Agilent does. Their business is in simulation of RF and small mixed-signal circuits – harmonic balance simulations, for instance. We just come in and speed the whole thing up. The same holds true for the other EDA vendors. For instance, we have established partnerships with Mentor, joining their OpenDoor program, and with Helic in Greece, who integrated a special version of our tools for automated modeling of integrated spiral inductors."

Mathias asked for permission to get technical. "Permission granted," I said.

He said, "Model order reduction is applied to netlists used for back-annotated simulation. You've got your schematics circuits, and you add in all these parasitics that come from the layout – resistors, capacitors, cross coupling, inductors, mutual inductors. You may also see RC effects in the substrates. The problem is that all those parasitics slow down all of the various simulators – even fast SPICE simulators. So, what we do is to take care of those parasitics which are not well addressed in the current extractors or simulators."

"We transform the models without corrupting the accuracy of them. The netlist coming out of the extractor is badly shaped for the simulator – the extractor generates an electrical netlist, very badly shaped for numerical analysis. The simulators, most of the time, have extreme problems with convergence. This has finally come close to being an art, to get back-annotated netlists to converge in simulations."

"The other reason our technology is important is because there's too much information in the netlist, since the extractors extract very fine-grained information. This is necessary in order to have sufficient accuracy. A lot of this information is not necessary for the analysis, but which, and to what extent, is difficult to determine."

"For instance, you can imagine the models are valid from low frequencies to very high frequencies – from 0.1 GHz to 100 GHz. But you're working on a Bluetooth design, for instance, at 2.5 GHz and there are some harmonics. So, from a certain frequency on, you don't care about the frequency of the results – unless you are sure that everything is fine with respect to the specifications."

"In fact," Mathias said, "there are a number of integrated solutions available that cover extraction and simulation. They're usually effective due to simplicity by filtering away large or small component values. But unfortunately, even small values may be very important within the context of the circuit – especially in analog or mixed-signal circuits."

"Or you could ask – what is a small value in a net, when everything is laid out with minimum dimensions. In other words, are all values within the same range for this specific net? Generally, numerical values over several tens of decades don't help either. In addition, the parasitic models are getting more and more complex due to DFM effects and layout additions like metal fill, skin effect, use of large via patterns, etc. etc. So it's actually much more complicated than it is supposed to be."

I asked, "But this can't be news to people. There must be a great deal of work already done in this area."

Mathias said, "The idea of model order reduction is not new, but doing it in a really efficient way and being sure that you don't lose anything with respect to accuracy is new. There are a huge amount of articles out there in scientific journals, and there are papers each year at DAC about model order reduction. But hardly anything has found its way into the EDA tools that comply to strong accuracy needs as well as strong reduction, which equals to speedup. It's a trade-off that is hard to set, and usually speed is largely preferred completely loosing accuracy gained in time consuming parasitics extraction."

"From my point of view, the most important reason that is the case is because most parasitic circuits come out of extractors ill-conditioned for the heavy-weight mathematical algorithms in academic papers. Most of the algorithms dwell on some university's test structures, but once you try to apply them in the real world, they fail or are too complicated to actually work on a real basis."

He pointed out that EDA solutions are not easy to come by: "We think model order reduction is an important issue, so we've developed a real-world solution. But that's not a simple process – it's not sufficient to just put 10 people around a computer to do this kind of development. You need a variety of ingredients."

"You need the information from electrical engineers about the circuit behavior. You need the computer scientists to get the best results out of the computer, and you need 'hard-core' mathematicians in order to judge what the algorithm should be, and to sort out the complexities of the algorithms. You also need those mathematicians to go out into other domains and discover what algorithms – not yet published in the EDA domain – might be useful to your EDA problem. Then, of course, you need someone to coordinate all of those different ingredients."

"Here at EdXact, we've got all four ingredients in house – the electrical engineers, computer scientists, mathematicians and coordinators. For the 'hard core' mathematical part, in order to be really sure what we are doing, we subcontract out to mathematicians the exploring of the different, non-EDA domains and the proving of the accuracy of the algorithms and conditions we've developed for our tools."

Our conversation was running long, and Mathias needed to go get some dinner. Before he signed off, however, I asked him how he and his associates had come up with the name of the company.

He said, "EdXact stands for 'Electronic Design – Extraction, Analysis, and Control Tools.' We work in this arena. Today, we are dedicated to netlist reduction, supplying software that makes a real difference. Tomorrow, we will move forward, into the analysis arena."

He laughed when I asked him why they had an English name for a French company. "Well," he said. "In French the name would have to be much longer. And then, only French people would understand."

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May 22, 2006

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