distributed SPICE simulations, bye-bye fast-spice

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SPICE simulations are the essential tool for any circuit designer. Without an accurate SPICE simulator a company might as well forget about reasonable yields when the chip finally tapes out. Nevertheless, with the ever increasing device counts and thus netlists, chip designers have had to make a choice between acceptable accuracy and reasonable runtimes. To overcome this tradeoff, circuit designers have been using many tricks to make current designs possible. For example, instead of simulating an entire block, a particular path of interest can be pruned and then simulated. Another trick is to mix and match extracted cells with cells for which parasitic are estimated on the flight. Yet another approach is to utilize fast-spice simulators, which instead of simulating each device and solving the equations associated with it, employ device switching approximations to estimate how the circuit is going to behave. Regardless, not matter how you slice and dice it, accuracy of the simulation is compromised in each case.But usually, where there is an interesting problem to solve, you can expect a startup to emerge trying to solve it. Case in point, Cupentino, California based Xoomsys Technology. Backed by Benchmark Capital, Morgenthaler Ventures, and Duff Ackerman & Goodrich, and have just finished second round funding which netted the company a nice $8 million, Xoomsys believe they have found a reasonable solution for the circuit designer’s dilemma. As the illustration below shows, Xoomsys proposes to parallelize the simulation onto a cluster of x86 machines.The approach is quite elegant and is implemented via what the company refers to as Scalable Performance using Enhanced Effective Decoupling, or SPEED for short. In layman’s terms, SPEED takes an existing netlist and parses it into individual and smaller netlists that can then be sent off to multiple systems that run a regular SPICE simulator on each of the netlists in parallel. The breakthrough here is the ability for Xoomsys the parse the initial netlist in such a way as to minimize the communication between the parallel machines while at the same time balancing the load across all the machines. The minimization in communication is accomplished by figuring out which parts of the netlists are mostly decoupled from each other and as such can be simulated individually. Most importantly, Xoomsys guarantees that the final output of the simulation, when all the pieces are combined back together, will be identical to that of a regular SPICE simulation that would have run on the original netlist. As such, what Xoomsys offers is more of an extension that enables a company to utilize their preferred SPICE engine more efficiently. And while performance numbers are not listed anywhere on the site, the technology itself seems quite promising.