Symbiosis Between Globalfoundries and IBM Needed for Long-Term Success – Petrov Group

Close Collaboration with IBM Can Provide Globalfoundries Advantage in 20nm and Thinner Nodes

[05/11/2010 11:05 PM]
by Anton Shilov
http://www.xbitlabs.com/news/other/display/20100511230539_Symbiosis_Between_Globalfoundries_and_IBM_Needed_for_Long_Term_Success_Analyst.html

The emergence of Globalfoundries could be one of the most significant events in recent semiconductor history, an analyst said. While for Advanced Micro Devices the creation of Globalfoundries resulted in cost savings only, for Advanced Technology Investment Company it is the chance to create the world's most powerful contract maker of chips. However, in order to achieve this, Globalfoundries will need to work closely with IBM and adopt its chip design tools.

Last week it was reported that Globalfoundries could acquire semiconductor manufacturing operations from IBM, which would provide it additional clients, manufacturing capacities and, perhaps, certain intellectual property. But while it is crucial for Globalfoundries to boost its advanced manufacturing capacities so to be able to compete against Taiwan Semiconductor Manufacturing Company already in the mid-term future, for long-term success it is very important for Globalfoundries to collaborate with IBM in general and adopt/deploy IBM chip design tool-systems, which would give Globalfoundries a decisive competitive advantage in 20nm, 14nm, and finer nodes, according to Boris Petrov, managing partner of the Petrov Group.

"IBM will maintain its integrated circuit (IC) process technology leadership via research, but the critical business requirement is also that its Common Platform silicon alliance continues to be successful. […] To be successful Globalfoundries would have to meet cost economics that IBM has apparently failed to meet. This evolution stage represents an immense opportunity – if Globalfoundries, jointly with IBM, is able to construct and implement a new and differentiated vision," Boris Petrov has written in a new column dedicated to Globalfoundries.

IBM Design Approach: When Perfection Means Isolation

The three primary areas of concern to an electronic system designer are power, timing, and noise. An optimal design technology addresses them in an integrated manner; such a system approach is the spirit as well as a distinctive differentiation of IBM's chip design approach.

“The foundation of IBM’s leadership position in technology-based services is IBM’s focus on automation; in the case of ICs it is IBM’s focus on automation of system-level design processes. Before actual implementation in silicon, IC design entirely resides in software – at the system architecture, modeling, and application levels. Such software-based IC designs and their design tools are among the most complex software ever developed, and their complexity will continue to increase,” said Mr. Petrov.

IBM's "abstraction engines” model basic concepts (shapes, timing, other) at such high levels that they are also used in IC-unrelated modeling (financial, materials, biological, other), notes Mr. Petrov. As chip designs become bigger and more complex, such an approach will be more and more compulsory for successful "first-pass" design with billions of transistors in 28nm, 20nm, and finer lithography technology nodes. The recent woes with TSMC’s 40nm and potential issues with 32nm have already cost chip designers millions of dollars, forced TSMC to can its 32nm fabrication process and the virtually the whole industry to reconsider the roadmaps. But nothing is likely to limit demands for higher-performance computing and going forward fabless designers of chips will have to work closely with foundries and the latter will have to concentrate on creation of design tools, which ensure that advanced designs can be made in high volumes and on time.

“The chip design factory approach to silicon integration will likely be the cornerstone of the sub-40nm semiconductor industry. In the sub-32nm chip designs, the emphasis decisively shifts away from an individual expertise and tools approach (the “presence of a super-engineer” concept) to a tightly integrated chip design factory approach,” explained the analyst.

IBM's IC design focus continues to be on the needs of state-of-the-art technology, still the center of the chip business has moved away from proprietary modeling and toward open systems which are mandatory for adopting third-party intellectual property and creation of third-party chips. Verification flow, making designs manufacturable without having to model down at the transistor level, and power and timing closure in 28nm and finer lithography all present immense new challenges, the analyst stresses. IBM has already expanded and integrated its tool systems with industry standard tools for commodity solutions. Nonetheless, the overall concept remained unchanged: IBM's tool systems continue to be aimed at the leading edge chips and third-party partners maintain and support the older tools.

What is important here is that only a handful of companies – including, but not limited to, AMD or IBM itself – require state-of-the-art fabrication process or designs. As a result, for IBM, its focus on perfection means isolation from the volume market. As a consequence, despite its advantage in design systems, IBM has had limited success outside internal use.

From Extreme to Mainstream

The mainstream merchant market's cost and IBM's profitability margin requirements are too far apart, therefore, it is unlikely that IBM will put much more efforts into development of its foundry business. IBM's cost structure and focus on its own demands often make IBM the IC design partner of last choice: a client selects and pays for IBM services because it has nowhere else to turn and since IBM provides an expensive guarantee of on-time delivery of differentiated chips.

On the other hand, the chips that contain billions of transistors and considered “extreme” today will become mainstream tomorrow and companies developing them will have to use chip design tools that not only support such complexity, but ensure their low power consumption and introduction on time. Complex devices – such as central processing units or graphics processing units – tend to increase their transistor counts rather rapidly and in less than ten years time there will be chips containing tens of billions of transistors. Needless to say that Globalfoundries and other contract manufacturers will have to provide tools to develop chips of that complexity and potential acquisition, adoption, and deployment of IBM’s chip design expertise and suite of IC design tool-systems will be just what the doctor ordered for the company.

“The time for full demonstration of the power and superiority of IBM's [chip design] approach is perhaps ahead. Perhaps, it will be the only approach possible in advanced lithography, with ICs with tens of billions transistors,” said Mr. Petrov.

In case the analyst is correct, then, if IBM sells its tools to Globalfoundries, the latter may find itself in a much more competitive position in years. Perhaps, with IBM's suite of chip design tool-systems Globalfoundries may become the only contract maker of semiconductors, who can produce state-of-the-art chips with tens of billions of transistors or at least it will be much more ahead of its rivals.

Globalfoundries Should Convert IBM’s Design Tools for Volume Production

“To successfully deploy IBM's IC design tool systems and expertise to much larger and rapidly growing segments of the consumer market, Globalfoundries would have to be able take the good and differentiated and to reject the obsolete and gold-plated,” said Boris Petrov.

At present Globalfoundries is fighting for manufacturing volumes via expansions of capacities as well high yields of chips made using leading-edge process technologies. But going forward – as chip designs get even more complex whereas mainstream customers will be unable to design them from scratch – Globalfoundries will have to provide complex support along with robust services, which is when/where IBM’s technologies of today will be required. The difficult challenge will be to drop the too expensive technologies and convert immensely valuable technology into fiscal gold.

“A key implication of Globalfoundries and the industry's evolution is that chip design is becoming synonymous with an industrial robotic factory. System vendors need tightly integrated chip design and wafer foundry factories. If Globalfoundries is able to obtain, adapt, and cost effectively deploy IBM's chip design capabilities it will have a decisive and sustainable competitive advantage in advanced technology nodes for its foundry customers,” asserts the analyst.

Tags: Globalfoundries, IBM, Semiconductor, AMD, ATIC