



Unisys™ Tackles 6 Million-Gate Design with Novas

Background

Unisys is a worldwide information technology services and solutions company. Its more than 37,000 employees offer expertise in systems integration, outsourcing, infrastructure, server technology and consulting to help clients, in more than 100 countries, quickly and efficiently achieve competitive advantage.

A particularly important product line for Unisys is its server business. Its enterprise servers include Intel based solutions that provide the features and functions needed to run mission-critical applications in Microsoft environments. They combine industry-leading performance at affordable prices.

The Unisys ES7000 family of high-end servers extends the benefits of Cellular MultiProcessing, the latest Intel® processors, and Microsoft® enterprise software. This 32- or 64-bit enterprise server family is ideal for IT executives who want to leverage the benefits of Microsoft standardization into the data center for their Windows based mission-critical applications and databases. Within this family is the ES7000 Orion 200 series, a mainframe-class server that delivers the highest levels of power, availability, and price-performance for Microsoft operating environments. Optimized for up to 32 Intel processors, this system can scale up far beyond other Intel based servers while delivering better price-performance than high-end RISC/UNIX based servers.

The ES7000 Orion 200 series offers unmatched flexibility, with a choice of three different Intel processors and six different operating systems that will run in up to eight independent partitions concurrently. Its mainframe-class reliability, availability, and serviceability characteristics make the system an excellent Windows platform for mission-critical applications and large-scale databases needing room for growth.

Complex ASIC design key to ES7000 functionality and performance

At the heart of this ES7000 server is an extremely large, complex ASIC. Developed by several teams in Unisys' Malvern, Pennsylvania design center, it has more than 6 million gates and is targeted at a leading-edge CMOS process.

The design teams consist of logic designers, verification experts as well as physical design engineers who perform place-and-route. The design of the ASIC for this ES7000 server was done entirely in VHDL, and design reuse was an



Unisys ES7000 Orion 200 Series

important part of their methodology, especially since this design required support for a newer version of the Intel processor powering the server.

With a design of this size and complexity, it was critical to have extremely powerful verification capabilities. Their strategy included server farms of event driven simulators, formal techniques, and even hardware acceleration. In the process of evaluating simulation solutions, they were introduced to Novas Software's Debussy® Knowledge-Based Debug System.

"For debug in previous projects, we had used the waveform viewer that came with the simulation tools we used," explained team member Art Nilson, who focuses on verification processes for the ASIC team. "We had to hand traverse source code, and often times we had guys painfully, slowly working their way through 6 or 8 open source code windows at once. With a design of this size, I won't say it's impossible, but it's certainly not practical."

After seeing the efficiency and ease with which Debussy allowed designers to track down bugs, they were hooked. With Debussy, Unisys engineers now had a unified view of the waveform and source code, and the ability to quickly move between them. The active annotation capability provided by Debussy was essential to helping them reduce the time spent in debug, as they could quickly delve into a design and understand design intent and relationships with a simple double click. Verification engineers use Debussy's powerful and intuitive features to find signal drivers and even compare



waveforms for different versions of the design, often times without even having to get the original designer involved.

Debugging without in-depth knowledge of the design

“The most important thing Debussy brought to us was the ability to make people who were not familiar with the design very productive quickly,” said design team manager Craig Church.

The size of the ASIC design dictates a very hierarchical approach to design, which often introduces challenges with regard to debug, especially for engineers who haven’t worked on the logic design itself. Debussy allows designers to easily browse the hierarchy of designs, tracking down a design error even if the design has gone through names changes or revisions.

It’s not just the verification experts that are using Debussy at Unisys, either. The logic designers at the front end of the design process find it helpful for quickly spinning new versions of the blocks they are working with in VHDL, and like the tight interaction with their simulation tools that Debussy’s open architecture and databases provide. Since they do a fair amount of verification themselves, they feel confident in the blocks they are handing off to the verification team, which must meet specific criteria for test coverage before being passed along again to the physical design team. Altogether, over 30 engineers on the design teams have access to Debussy to use at various stages of the design process.

“Another thing we like about Debussy is that we can use it with any of our simulation tools, whether it’s our event driven tools or the hardware accelerator,” said Nilson. “And for a recent project, we’ve had to add support of Verilog, so it’s nice to have the flexibility for design groups to use whichever language they want.”

Church and Nilson also praise the quality of the Novas software, noting that their team has yet to report a bug to Novas and receives top-notch customer support on issues or questions they have with Debussy.

Meeting schedules is the bottom line

The Unisys schedule for the ASIC and the server product it powers was an aggressive one, and the design team credits Debussy with allowing them to meet their milestones. While they don’t specify how much time it saved them, they do know they probably couldn’t have stayed on track without it.

“Meeting our schedule is always the most important thing, and with Debussy our productivity improvement was significant. Debussy made it possible to meet the challenges we faced with regard to higher levels of integration and design size on an ASIC that is critical to future generations of enterprise servers from Unisys,” Church said.



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