AMD

Abaco Systems Offers Hardware Development Kits with AMD's Abstract Shell Design Flow

Featured on UltraScale+™ Devices, Abstract Shell Cuts Licensing Costs and Improves Collaboration and Compile Time Efficiency for Mission-Critical Applications

AT A GLANCE:

Abaco Systems (a subsidiary of AMETEK, Inc.) is a global leader in commercial open architecture computing and rugged embedded electronics. With more than 30 years of experience in aerospace & defense, industrial, energy, medical, communications and other critical sectors, Abaco's innovative solutions align with open standards to accelerate customer success.

Industry: Embedded Electronics
Headquarters: Huntsville, Ala., USA
Established: 1985
Website: www.abaco.com

Figure 1. Abaco Systems VP431 RFSoC Board

SUMMARY:

Abaco Systems has been seeing growing demand for programmable logic devices in mission-critical applications, such as aerospace and defense. Programmable logic gives vendors the flexibility to use compute resources in many different ways in order to build custom designs. Leveraging a feature called Dynamic Function Exchange (DFX), vendors can swap functions within an application while the system is in operation. This provides invaluable strategic and cost advantages over less-flexible alternatives.

The company's new Hardware Development Kit (HDK) takes DFX technology one step further by leveraging AMD's abstract shell design flow to deliver a pre-compiled and timing-closed shell to its end-customers that improves collaboration and compile time efficiency and reduces licensing costs.

CHALLENGE:

Abaco Systems has many customers involved in aerospace, defense, industrial, and medical applications. They require secure, state-of-the-art technology that can operate in rugged environments.

"We had customers saying 'We want access to programmable logic. How do we get there?'," said Cameron Vandiver, global FPGA engineering manager at Abaco Systems. "We wanted to be able to deliver solutions to our customers that allowed them to add their own custom IP next to ours, while figuring out a way to offer licensed IP from third parties without passing along the licensing costs."

"We participated in an early access program with AMD and were one of the first companies in the U.S. to fully embrace their abstract shell technology," Vandiver added. "Our goal was to deliver designs to customers where we could protect the integrity, security and functionality of what we need to do with the FPGA, but also allow our end customer to develop their IP as well, and abstract shell seemed like the perfect solution."

SOLUTION:

Abstract shells are a feature in AMD's Vivado™ 2020.2 design suite for all UltraScale+ devices. The standard DFX flow requires multiple passes through the implementation tools. Abstract shell creates a trimmed down version of the static design for a given reconfigurable partition. It is the minimal design image needed to provide context for implementing a new reconfigurable module.

Abaco Systems developed a Hardware Development Kit (HDK) built around AMD's abstract shell technology that is being offered with many of its products. The HDK enables the company to offer a design flow with top-level example designs in a more cost-effective way. Abaco Systems can deliver a partial bitstream that keeps the integrity of the IP and potential third-party IP, while enabling customers to develop and implement their own IP in the unused and allocated Reprogrammable Partitions (RP).The abstract shell feature provides a pre-compiled shell to the end customer that has the board interface logic completely implemented and timing closed, and then gives the customer the flexibility to customize their design from there. It also allows the company to incur the cost of IP licenses and not pass it along to their customers (though the end customer is still required to understand the license agreement for redistributing the IP).

Additionally, abstract shells dramatically improve compile time and enhance design security for environments involving dynamic function exchange. Key benefits of abstract shells include faster runtime (up to 10x faster, depending on size of application) and significantly reduced memory usage. Users can also compile all reconfigurable modules incrementally and in parallel, resulting in an average compile time reduction of 5x and, up to 17x, compared to traditional full system compilation. The design flow also protects the customer's IP by "hiding" the design details outside of the modules, and bypassing IP license checks.

"We're delivering a design flow with an example design top-level that incorporates the static bitstream and reconfigurable partition," said Vandiver. "It's all about adaptability and scalability for our customers. Now we can offer a single-board computer that supports multiple densities of programmable logic devices, allowing users to do classified design work and ship directly to their end-customers."

RESULT:

Vandiver said Abaco Systems offers HDKs using abstract shell for the AMD-based VP431 RFSoC board, the IPN254 multiprocessor, and SBC6511 and SBC3511 single-board computers.

"We can offer an HDK on any product that has a AMD device. In each case, we'll make a decision about whether the device has enough resources available, and whether the target market has customers that would need that technology," Vandiver said.

"We have a strong partnership with AMD because of the types of products that they offer, their great support, our familiarity with their parts and tools, and the fact that their products consistently meet the needs of our end customers," he added.

ADDITIONAL RESOURCES:

Learn More about AMD's UltraScale+ Platform

Learn More about Abaco Systems

Learn more about Abaco's Hardware Development Kit