

US Media Contact:

Emily Taylor
Weber Shandwick Worldwide
519 SW 3rd Avenue, Suite 600
Portland, OR 97204
United States
www.webershandwick.com
Telephone: 503-552-3733
Mobile: 503-381-7801
Email: etaylor@webershandwick.com

Altium Media Contact:

Alan Smith
Altium Limited
Level 3, 12a Rodborough Road
Frenchs Forest, NSW 2086
Australia
www.altium.com
Telephone: +61 2 8986 4409
Mobile: +61 404 432 700
Email: alan.smith@altium.com.au

Designing with the Altium Innovation Station

Device intelligence for sustainable differentiation

The Altium Innovation Station combines the award-winning Altium Designer unified electronics design software – which brings together hardware, software and programmable hardware design within a single design environment – with the newly-extended Altium NanoBoard range of reconfigurable hardware platforms. The result is a complete electronics design environment that puts programmed device intelligence at the center of the design process, and allows designers to focus first on functionality, and then choose the most appropriate devices and platforms on which to deploy this functionality.

Design concepts are captured in a choice of design entry systems, developed and debugged in real time on real hardware, then deployed to a custom printed circuit board, or (in the future) to off-the-shelf deployment NanoBoards from Altium.

Design capture – Altium Designer’s unified electronics design environment

Using the Altium Innovation Station, designers first turn to Altium Designer – Altium’s award-winning unified design system. Designers start the design process by capturing the functional intelligence using simple, visual design systems that make the most of their existing skills.

Altium Designer creates the embedded software that defines the design’s critical functionality using C language tool chains for a wide range of supported processors, including Altium’s 32-bit TSK3000, Xilinx® MicroBlaze™, Altera® NIOS®, Virtex®-2 Pro-

based PowerPC® 405 hard-core, the discrete AMCC® 405 processor range and the Sharp® BlueStreak™ ARM7™ range of discrete processors, plus more.

Designers then choose the embedded hardware on which the software will run from a wide range of pre-verified, pre-synthesized IP function blocks - ready to use with all supported programmable devices, including software drivers. Altium Designer supports all major FPGA families from the major FPGA vendors: Actel™, Altera®, Lattice®, Xilinx®.

A schematic-based entry system creates hardware from function blocks. The functional elements are simply “wired” together to create a complete embedded system from processors, memory, peripherals, and a range of logic and interface blocks.

Altium Designer’s OpenBus advanced drag-and-drop graphical capture system can also be used to capture processor-based designs, using functional icons from a palette and connecting them using simple data flow lines. This creates sophisticated embedded systems divorced from the complexity of the underlying hardware architecture.

Develop designs in hardware

The Altium Innovation Station lets designers develop in real hardware without the need to rely on simulation. They can choose from programmable device daughter boards such as the Altera® Cyclone™ II, Xilinx® Spartan™-3, Xilinx® Virtex™-4 and LatticeECP™. Four new daughter boards are on show at ESC and more are in development by Altium.

The plug-in hardware peripheral boards connect the functional intelligence of designs to the real world. Peripheral boards and daughter boards can be changed on the fly, as the design develops and the hardware needs become clearer.

The system reconfigures itself to new hardware automatically, in a unique plug-and-play design environment. Altium Designer and the Desktop NanoBoard connect using the high-level NanoTalk protocol, which provides full bi-directional communication (via USB) between the development software and hardware elements of the Altium Innovation Station.

And the NanoBoard platform comes complete with all the IP elements such as hardware blocks, software drivers and interface systems.

Implementing and debugging designs – moving to the Desktop NanoBoard development platform

Designers using the Altium Innovation Station upload their functional design to the Desktop NanoBoard reconfigurable hardware development platform.

This is a 'one touch' process: the design is quickly compiled, synthesized and programmed into hardware. Device-level place and route is handled transparently via the relevant engines in the applicable FPGA vendor tools. Designers can debug both software and hardware in the one system.

Designers then test and 'probe' their designs using a range of advanced, interactive Virtual Instruments programmed into the device. They communicate with these via virtual instrument panels in real time, via the NanoBoard's advanced JTAG-based communications. Along with advanced instruments such as Logical Analysers, a unique Power Monitoring instrument is provided to help them monitor and optimize critical power usage within the design.

They can debug right into the heart of the design by seeing and manipulating the real time status of pins, no matter how physically inaccessible they are. Using JTAG boundary scan monitoring, a JTAG viewer displays the active pin states of any JTAG supported part (including FPGAs) within the design.

Design performance is optimized by changing processors and hardware devices without disrupting the soft functionality of the design. Software functions can be accelerated by compiling them directly into hardware co-processors using the C-to-hardware generation capabilities of the Innovation Station. This is done using Altium Designer's Unified Hardware-Software compiler, which allows global variables, functions and algorithms defined in standard C-code to be selected and translated directly to hardware – so designers can choose what works best for the design.

Deploying the design

The Altium Innovation Station makes it easy to deploy designs to manufacture, or direct to the customer.

The fully-debugged and optimized Desktop NanoBoard design can be ported directly to a custom board using Altium Designer's advanced board-level design capabilities (see below). All of the NanoBoard's IP and hardware (including the NanoTalk interface) are included in Altium Designer, so fully-developed working designs can be transferred straight to the new hardware.

Designers can also use the Desktop NanoBoard itself for proof of concept, or deploy it as a working unit for a rapid solution to customer needs. Designing in the soft domain also means that updates can be done at any time by reprogramming both the hardware and software functions in the field.

Innovative deployment options

Altium is developing a range of deployment NanoBoards that will let designers move their device intelligence directly into an off-the-shelf, application-specific production unit – for short-run prototypes or small volume production, without having to complete any custom hardware design. Prototypes of these deployment NanoBoards are at ESC and will be available later this year.

Alternatively, Altium Designer's Board Design Capabilities allows designers to move their defined hardware platform directly from the Desktop NanoBoard to their own custom board designs. All the IP for the NanoBoard – for the peripherals and for the programmable devices - is provided as part of the license. Designers can use this option to move rapidly to final hardware and production.

Altium Designer's Board Design capabilities are part of Altium's unified design environment. Final board layout reuses the IP from the Desktop NanoBoard within the same unified environment, with Altium's powerful board design features. Synchronization between the FPGA project and the physical board design is automated, where pin and I/O assignments are automatically updated within user-definable constraints.

This, plus advanced autorouting, real-time 3D visualization and rules-driven high-speed design facilitate design of the physical platform based on the working design.

ENDS

About Altium

Altium Limited (ASX:ALU) is the leading developer of electronic product development solutions dedicated to unifying the different design disciplines involved in electronics product development. Altium products ensure all electronic engineers, designers, developers, and their organizations, take maximum advantage of emerging design technologies to bring smarter products to market faster and easier. Founded in 1985, Altium has headquarters in Sydney, Australia, sales offices in the United States, Europe, Japan, China, and resellers in all other major markets. For more information, please visit www.altium.com.

About Altium Innovation Station

The concept of the Altium Innovation Station combines the Altium Designer electronics development tool with Altium's NanoBoard range of reconfigurable hardware development and deployment platforms to provide the single design environment for sustainable differentiation in electronics design. Together, they allow electronics designers to create value and innovation in their products by focusing on designing device intelligence.

Altium Designer's unified design environment means users can harness the potential of the latest electronics technologies, and move to a 'soft' design methodology without the need to acquire specialist programmable device expertise. It unifies the design of the hardware, software and programmable hardware by removing the disparate design flows of old design methods and thinking.

Altium's NanoBoard range of reconfigurable hardware platforms allows for both the development and deployment of device intelligence based on programmable devices such as FPGAs. Altium's NanoBoard architecture is unique in that it comes complete with a range of programmable devices housed on plug-in FPGA daughter boards, and interchangeable peripheral boards. The development NanoBoard provides a versatile reconfigurable development platform independent of the choice of FPGAs. In the future, deployment NanoBoards will allow rapid completion of the design process to final hardware – without the constraints of having to design hardware early in the design process.

For more information, please visit <http://www.altium.com/Products/AltiumDesigner/>.

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