

Just what is a *blade*, anyway?

By J. Eric Gulliksen

There is a tremendous amount of ambiguity surrounding the term “blade,” particularly in the embedded space. It has become a marketing buzzword used to describe a variety of different product types, which has created confusion rather than differentiation in the marketplace. This article presents VDC’s definition of the term, the logic behind this definition, and the ways in which we differentiate between blades and other embedded board types.

Beginnings

VDC first encountered the term blade during the course of research for our first report on *Switch Fabrics and High-Speed Serial Interconnects*, published in November of 2001. There appeared to be an intimate association between these interconnect technologies and the term *blade*. However, there was no clear definition for blades, blade architectures, or blade-based systems and, as the term became more widely used, this association with fabric technology started to become blurred. Definitions for *blade* found in various glossaries on the Web could be applied to Single Board Computers (SBCs) in general. We began to ask engineering and marketing professionals in both the embedded board and enterprise communities for their definitions in an attempt to arrive at a consensus. Some of the divergent responses we received from the embedded industry included:

- Just another, sexier word for *board*
- A board with some sheet metal wrapped around it
- A single board computer that has been optimized as a server
- The combination of a carrier board and a PMC card
- A PICMG 2.16 SBC
- An expansion card that plugs into a motherboard
- Another name for a 1U *pizza box* server

However, many of the other responses included an element of commonality, in that they *did* cite the use of high-speed serial or switch fabric interconnects as the

primary means of interboard data communication. Discrepancies within this group were primarily related to the use of shared, parallel buses as additional means of interboard communication, or to functional types.

The Enterprise space showed a greater degree of clarity, although most Enterprise-class *blades* were of proprietary architectures or form factors. Here, the data communication means between *blades* was limited to high-speed serial or fabric interconnects, with little differentiation between functional types.

The VDC definition

Keeping these considerations in mind, VDC developed the following working definition for an embedded component-level *blade*.

An embedded component-level blade is a computer board with the following characteristics:

1. It is designed to be inserted, usually vertically, in a slot in a card cage or chassis mounted on a rack.
2. It connects to a passive backplane, and communicates data to other board level components in the immediate host system only via a switch fabric or other high-speed serial interconnect. Any shared, multidrop, parallel data bus that may be present is local to the blade and is not carried to the backplane.

We therefore base our definition on the structure of the interconnect architecture and do not limit it in any way by functional type, application, local bus, form factor, feature set, or any particular high-speed serial or fabric interconnect technology or topology.

VDC presented this definition to several of the individuals that we had previously interviewed, most of whom agreed that it made sense and provided much-needed clarity and differentiation between *blades* and boards using parallel buses as an interboard communication means. We then presented the definition ver-

bally at the Bus & Board Conference in January of 2002, and it has now been accepted by a majority of the embedded board industry.

(Note that certain *blade servers*, which include 1U, 2U, and 4U devices, do not comply with provision 1 of this definition and may communicate with other blade servers via fiber or cable, without a backplane. We consider these to be system-level, not component-level, devices.)

Specifications

Of the various open standards in existence to date, only AdvancedTCA (PICMG 3.x) comprises a true *blade* specification. CompactTCA will also be a *blade* specification. Other standards such as PICMG 2.16 and 2.17 have provisions that allow, but do not mandate, blade configurations under the VDC definition. A CompactPCI single board computer example may help to clarify this gray area. Note that we will use the term *switch fabric* generically to include both fabrics and other high-speed serial interconnect means that may not be fabrics. In addition, the VDC definition allows for other functional types (such as I/O and mass storage) to be substituted for SBCs, and allows for *PICMG 2.16* and *Ethernet Fabric* to be replaced by other specifications and technologies, as appropriate. Thus, 2.16 may be replaced by 2.18 and *Ethernet Fabric* by *RapidIO*, for example.

”Traditional” CompactPCI SBCs *do not* include switch fabric access. Therefore, these *cannot* be *blades* under the VDC definition, and there is no ambiguity.

PICMG 2.16-compliant SBCs *do* include Ethernet Fabric access via the P0 connector. In other words, these are *fabric-enabled*. Fabric-enabled SBCs *may or may not* be *blades*, depending on their configuration:

- If these SBCs carry *both* the shared PCI bus and the Ethernet Fabric to the backplane as is permitted by the specification, these are *not blades*. We call these *nonblade fabric-enabled SBCs*. These configurations allow backward

compatibility with legacy backplanes and systems.

■ If, as is also allowed under the PICMG 2.16 specification, the shared PCI bus is *not* carried to the backplane, these SBCs are *blades* under the VDC definition.

What if a fabric-enabled PICMG 2.16 SBC is used with a *backplane* that *does not* have the capability of connecting to or carrying the PCI bus between boards? Does this make the SBC a *blade*? No. In this case, the board is still a fabric-enabled SBC, but it is being used as a *blade*.


Recent study findings on CompactPCI SBCs and CPU blades

VDC's newly published report, *Merchant Computer Boards for Embedded/Real Time Applications Market Intelligence Program, 2004: Volume V: Overview*, indicates that, to date and other than AdvancedTCA, the only standards-based blades available are of the CompactPCI local bus architecture and form factor. Table 1 shows the dollar volume shipment shares of CompactPCI SBCs, in 2004,

Configuration	Shipment shares by percent of \$ volume
"Traditional" CompactPCI	43 percent
Fabric-enabled nonblade SBCs	44 percent
CompactPCI CPU blades	13 percent

Table 1

segmented into the three configurations mentioned earlier.

As a whole, shipment shares of fabric-enabled SBCs, including *blades*, are expected to continually increase. The relationship between shares of *blade* and nonblade fabric-enabled configurations is, however, projected to remain relatively constant until the CompactTCA specification becomes finalized. Ultimately, shipments of CompactPCI CPU *blades* are expected to overtake those of nonblade fabric-enabled SBCs, with the latter becoming relegated to a transition architecture. 

J. Eric Gulliksen been with VDC since October of 1999 and is currently practice and project director for the *Embedded Hardware discipline*, which

includes Merchant Computer Boards and Integrated Systems for Embedded and Real-Time Applications. He holds BSEE and MMgS&E degrees from WPI, and an MBA from Clark University. Eric has been awarded 17 US Patents, and has international field experience in 22 countries.

For further information, contact Eric at:

Venture Development Corporation

One Apple Hill Drive
Ste. 206, Box 8190
Natick, MA 01760
Tel: 508-653-9000
E-mail: ericg@vdc-corp.com
Website: www.vdc-corp.com