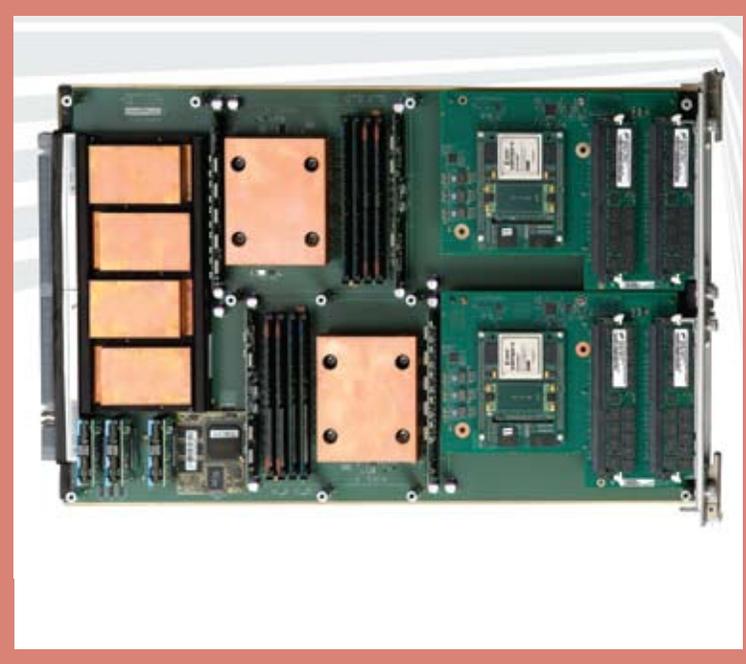


Cray XR1™ Reconfigurable Processing Blade

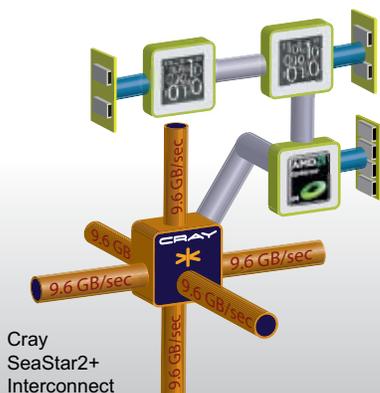
The Cray XR1 Reconfigurable Processing Blade, compatible with existing Cray XT3™ and Cray XT4™ systems as well as new Cray XT5_h™ systems, offers users orders of magnitude speedup on select applications as well as large potential savings in cooling and space. Building on the established track record of the Cray XT™ product line and the reconfigurable computing capability in the Cray XD1™ system, the Cray XR1 reconfigurable processing blade is the first product on the market capable of massively parallel reconfigurable computing.

Cray XR1 Reconfigurable Processing Blade



High Bandwidth, Direct Connect Architecture

A Cray XR1 reconfigurable blade has two nodes, consisting of a single AMD Opteron™ processor tightly coupled with two DRC Computer's reconfigurable processing units (RPU's). This connection is made directly with HyperTransport™, which ensures that RPU's are tightly coupled with AMD Opterons, delivering low-latency and high-bandwidth communication between the processing elements.



Massively Parallel Reconfigurable Solution

The Cray XR1 blade leverages the infrastructure of the Cray XT5_h system. These elements include the cabinets, cooling, login, I/O environment and Cray SeaStar2+™ interconnect. As such, up to 30,000 of the largest Xilinx Virtex™ -4 FPGAs can be integrated into a single system and applied effectively against demanding problems.

Cooling, manageability and reliability are all attributes inherited from the Cray XT series of supercomputers. Up to 96 reconfigurable processors are in each cabinet (48 reconfigurable nodes). Existing customers can upgrade by adding Cray XR1 processing blades or full cabinets of reconfigurable processing elements.

Flexible, Hybrid Computing

Because the Cray XR1 blade fits directly into a Cray XT supercomputer, it is possible to build a system with a mixture of node types. This allows users to direct jobs to the most appropriate computational resource for optimal execution. The Cray XT5_h utilizes a Linux environment which ensures that resources are scheduled and utilized smoothly and effectively.

Programmable

The Cray XR1 reconfigurable processing blade comes complete with a well-defined software API to allow users to smoothly integrate reconfigurable routines into existing programs through the use of function calls, thus insulating users from a major obstacle to successful code development.

In addition, the Cray XR1 environment is compatible with the DRC Development workstation. The DRC Development workstation is compatible with a full set of best-of-breed software tools for creating algorithm bit-streams for FPGAs. These include software packages from Celoxica, Synplicity, Mitronics, Impulse, DSPlogic and others. Bit-streams created and debugged on the DRC Development workstation can be easily moved to a fully-scaled application on the Cray XT5_h system.

Sample Applications

- modeling
- simulation
- rendering
- synthesis
- searching/sequencing
- sorting
- cryptography
- compression

Cray XR1 Specifications

Xilinx Virtex-4	LX200
Number of LUTs	200,448
RPSysCore use of LUTs %	min 14,400 (7%) max 20,000 (10%)
Socket	Socket 940
Power	12kW per cabinet
HT Interface	HyperTransport 1.0
HT Bandwidth to RPU	400 MHz x 16 bits or 3.2 GB/sec
Local Memory	1-4 GB, 128 bit DDR 400, 6.4 GB/sec
Host Opteron Memory	2-8 GB, 128 bit DDR400, 6.4 GB/sec
RPU RLDRAM	256 MB
HT bus per connection	400 MHz x 16 bits or 3.2 GB/sec
Memory	128 bit DDR 400, 6.4 GB/sec
Memory (RPU)	6.4 GB/sec
Software	API Compatible with a wide selection of tools for bit-stream creation

Cray also offers a development platform for modifying application subroutines to run in hardware. A DRC Development System is a complete server that includes the DRC RPUs and a compatible software environment.