Acceleration technologies for high-performance computing

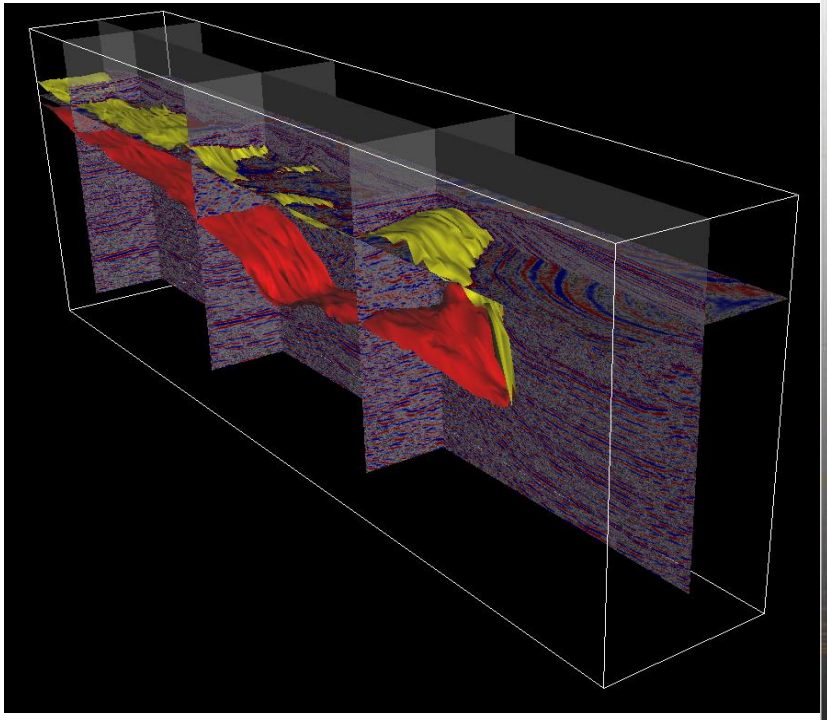
CRAY Users Group - May 2007

About DRC

- Announced OEM relationship with Cray in May 2006.
- Programmable coprocessors for compute-intensive applications
- Complete development platform for developing accelerated applications

Real Customer: 3D Seismic Imaging

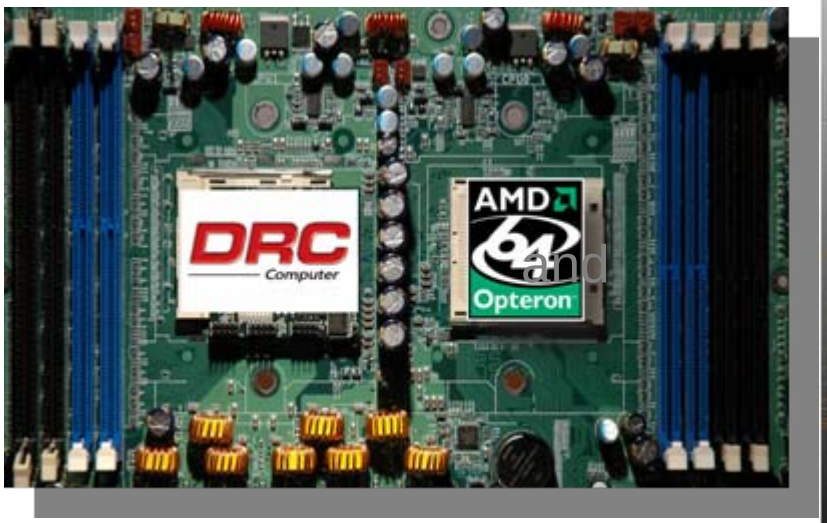
- Creating this visualization using traditional microprocessors required:
  - Terabytes of data
  - 1000's of processors
  - Months of computing
- The DRC RPU™ system:
  - 5X node count reduction
  - Save 85% on utility bill
  - Less than half the cost of non-accelerated solution



Data courtesy of Unocal

DRC Leverages Standard Technology

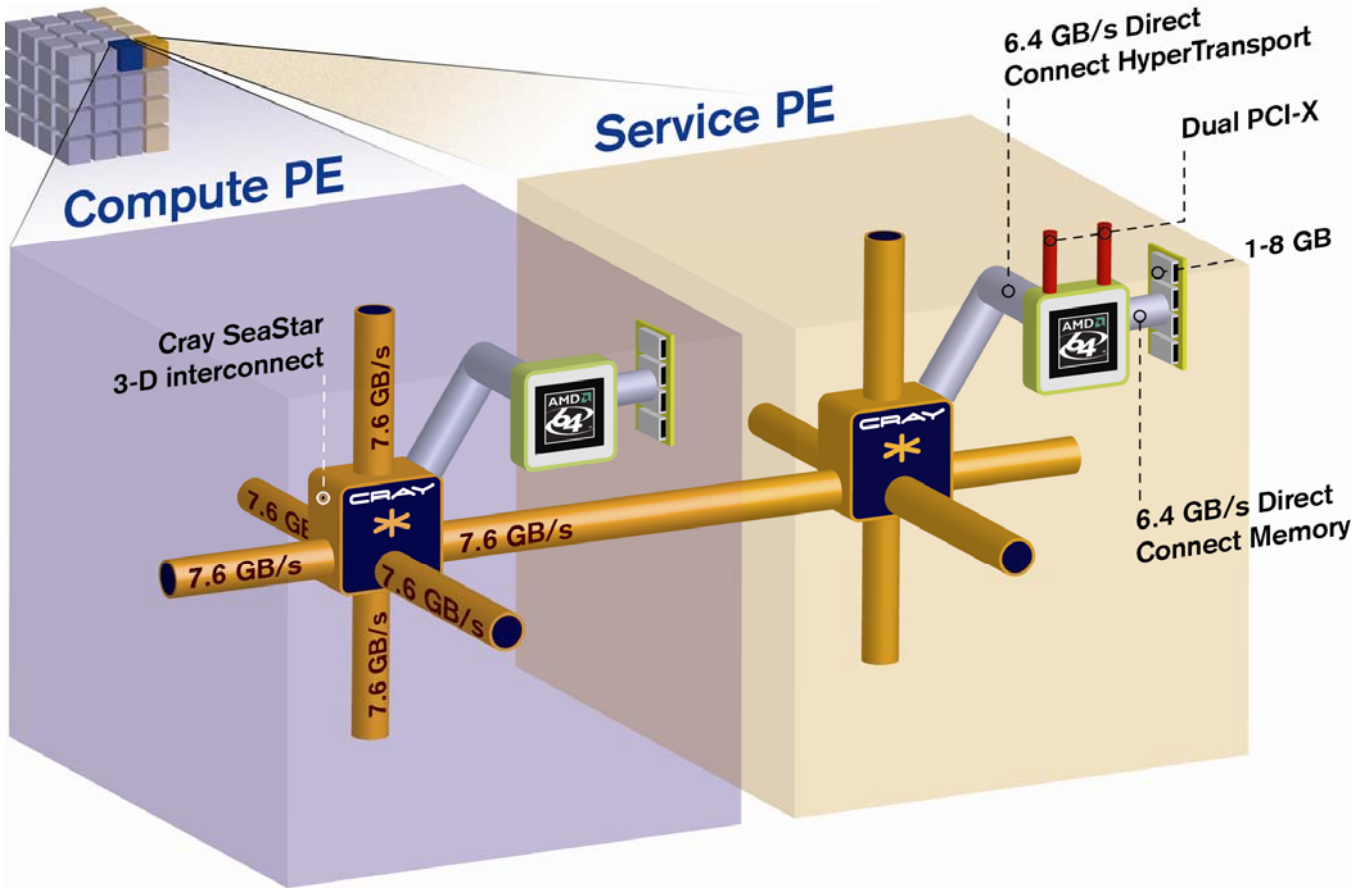
- Provides a standard programming environment
- Leverages world-class processors, memories, and motherboard technology
- Uses world-class FPGAs
- Enables quick response to standards changes:
  - Upgradeable software flexible hardware
  - High performance
  - Fast time to market



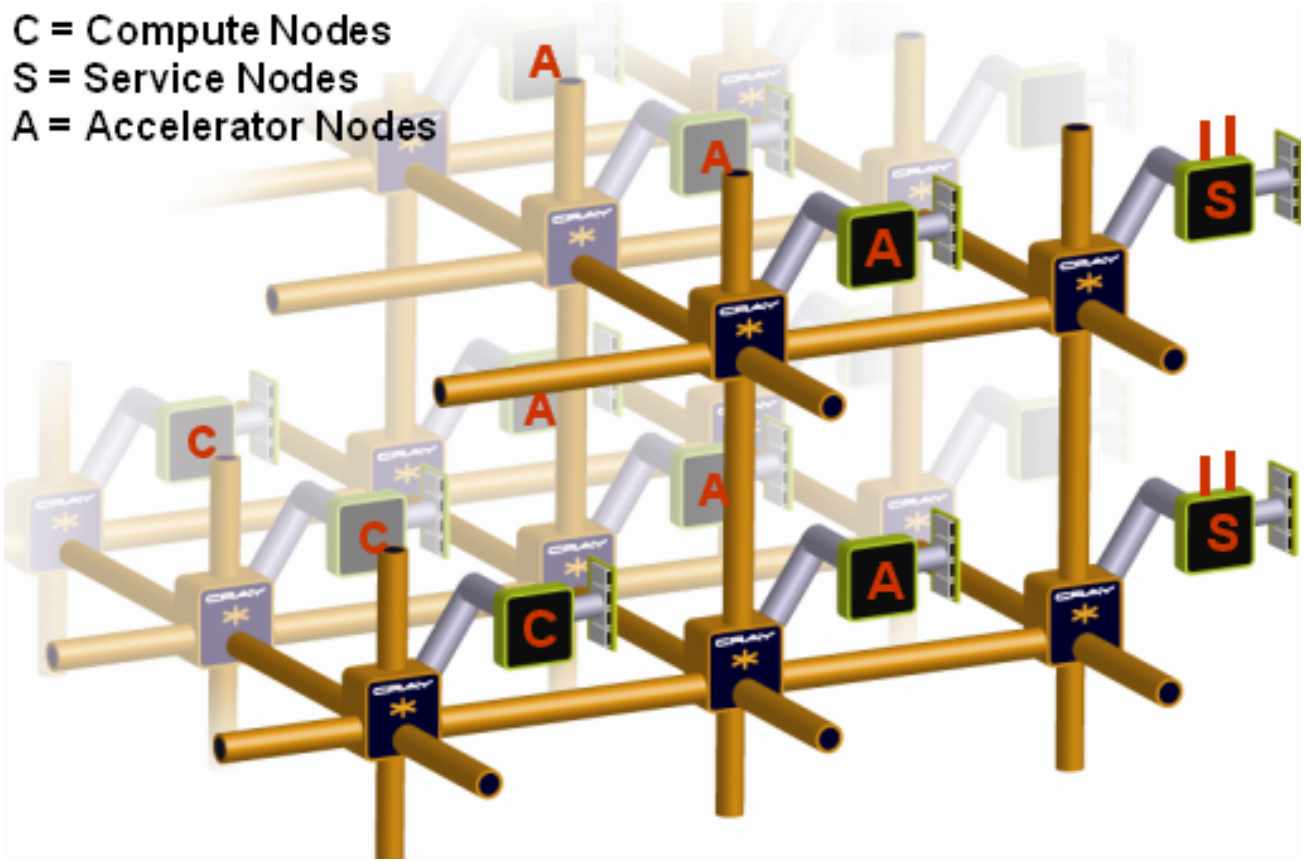
RPU110 -L200:
The most powerful coprocessor available

- Largest FPGA available
- Most memory available (8.1GB)
- Highest memory BW (10.6GB/s)
  - 8GB DDR1 (motherboard, 6.4GB/s)
  - 8GB Opteron memory (1.6GB/s)
  - 128MB RLD-RAM (2.3GB/s)

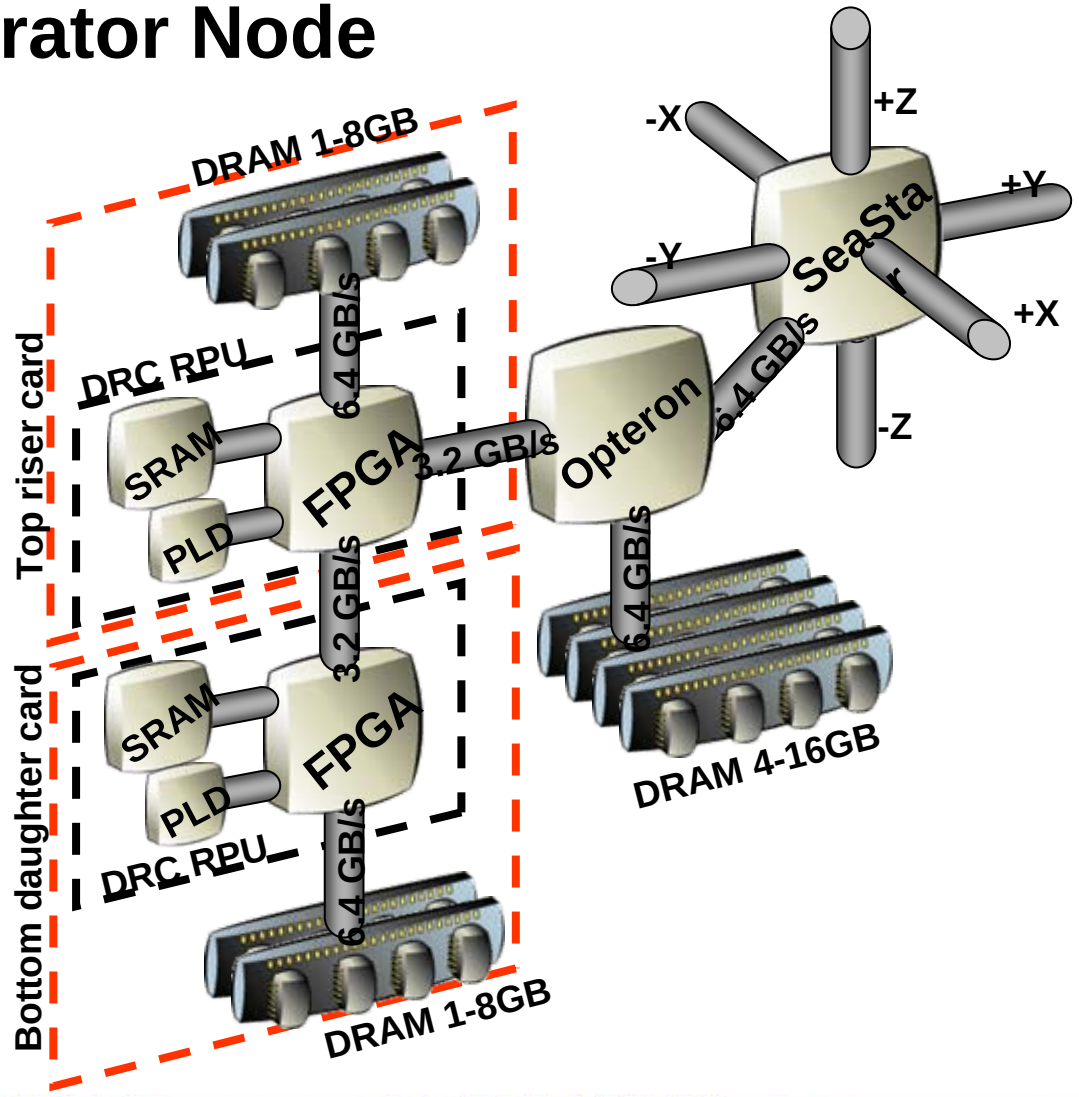
CPUs and RPUs - peers on a fast interconnect.



The Heterogeneous mix of nodes



Accelerator Node

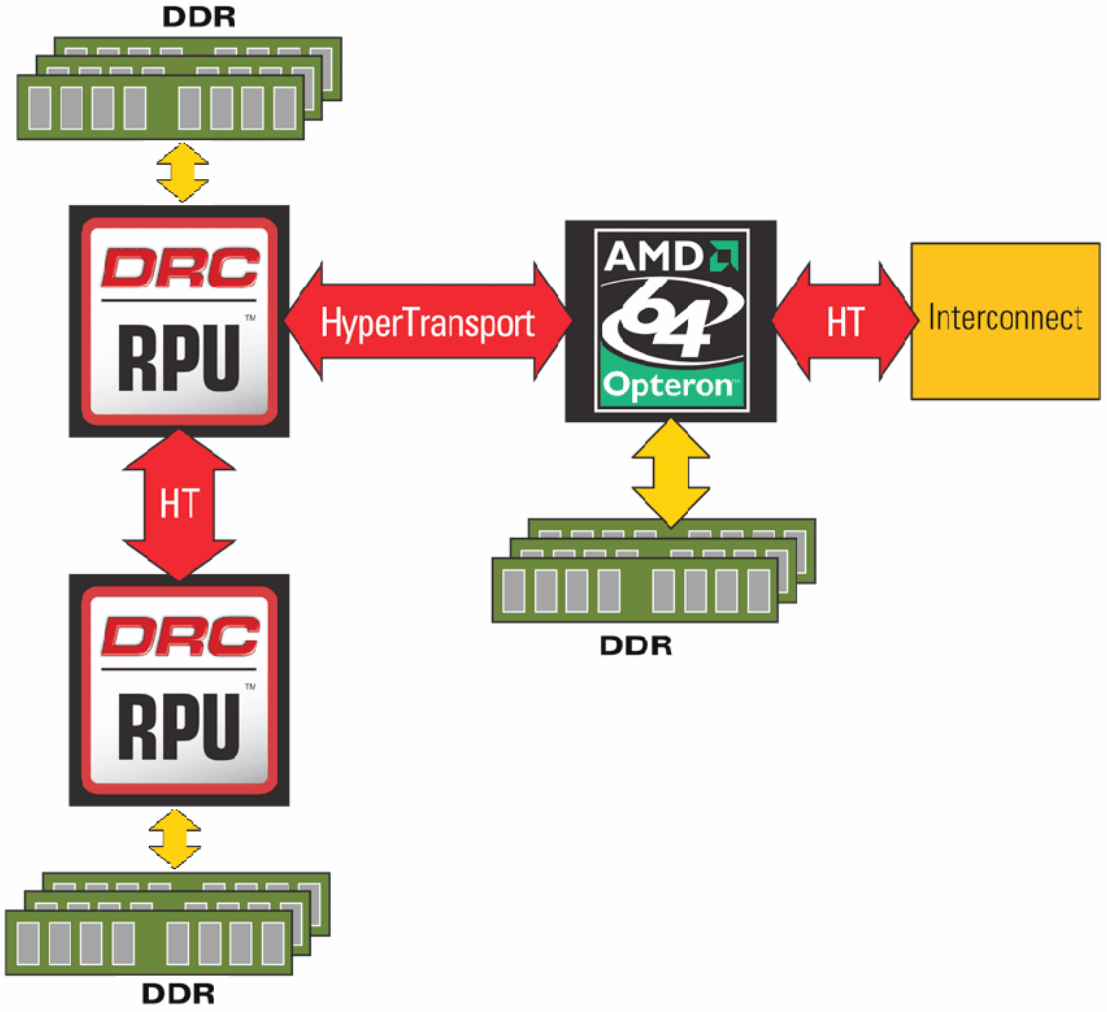


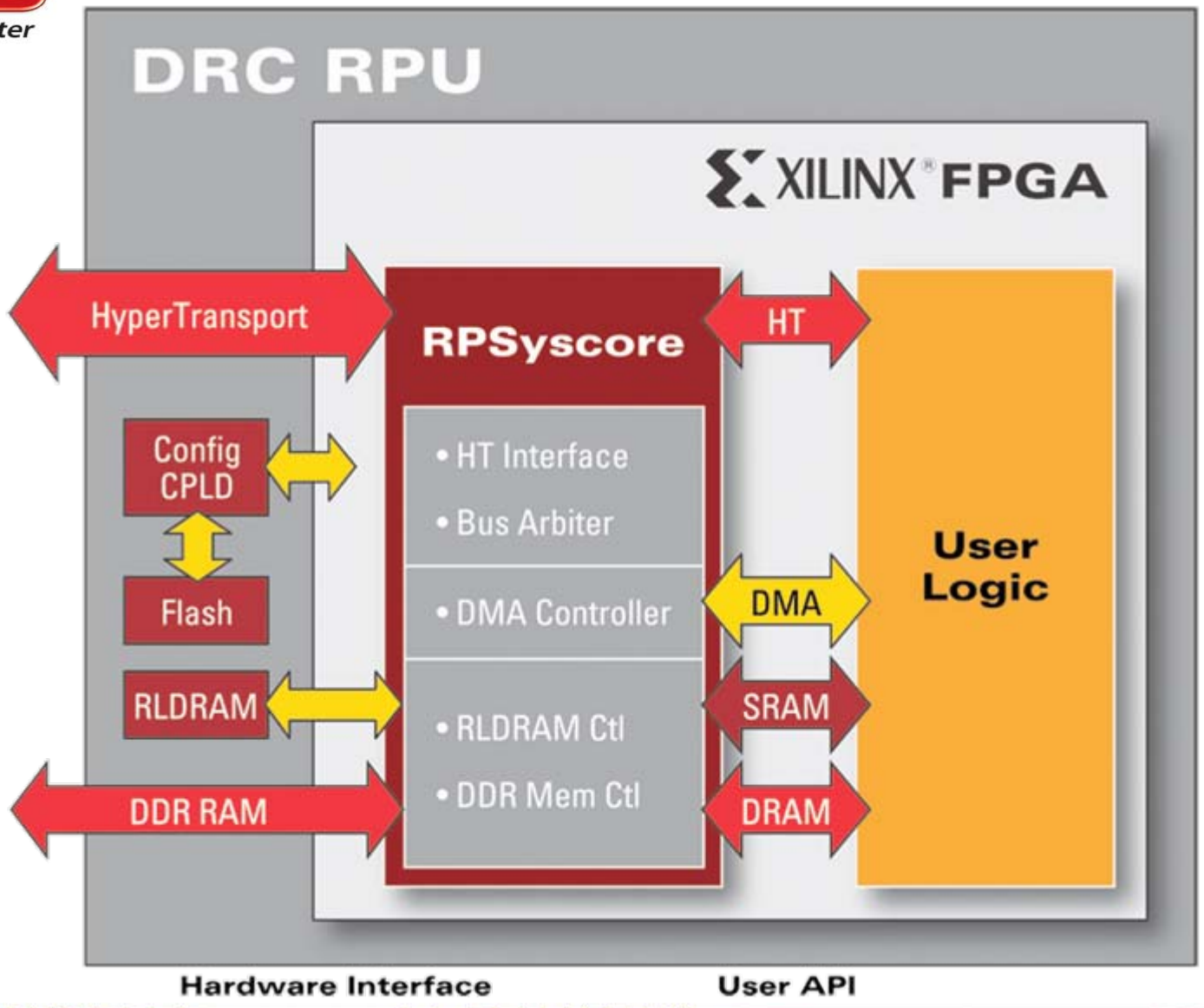
DS/XT

Development Systems for Cray XT supercomputers

The DRC DS/XT is a complete development platform that contains everything you need to get started modifying your application subroutines to run in Cray XT computer systems.

Accelerator PE = DS/XT Node





Complete Solutions Partners

Development tools

- Celoxica
- DSP Logic
- Impulse C
- Mitrionics
- Synplicity
- Xilinx

Products and services

Celoxica (UK)

Synective (Sweden)

XISS (Houston, TX)

XLBiosim (Switzerland)

Typical Project Flow

- Analysis & Design – 2-3 man-months
  - Architect the application for fine-grained parallelism
  - Choose an implementation strategy (partners, tools etc.)
  - Estimate project time and cost
- Prototype: 3-6 mm to simulate, port and verify
  - Simulate for size, performance, function
  - Design and develop firmware
  - Bring-up prototype RPU and system
- Production: 1-2 months to validate, stage and install

Support:

- DRC for all support contact
  - H/W
    - In conjunction with OEM supplier
    - Remote, 24 hour replacement
  - S/W
    - RPU S/W by DRC
    - Tools with tool vendors help

Make it work for you

- Get your development done:
  - Without burning cycles on the main supercomputer
  - Supports scientists need to experiment
  - Identical configuration of H/W node and MPI
  - Affordable as a personal “unshared” platform
- A simple as possible today
  - RPSysCore simplifies physical interfaces
  - Tools provide best-in-class choices
  - Documentation includes:
    - Quick start guide
    - Descriptions and glossaries
    - Tutorial examples

Questions?

Availability

- Offered through Cray or through DRC
- Availability:
  - Now in 2x2;
  - August 2007 for 1x2