ACML GPU support
SC2007 BOF session

November 13 2007
ACML- AMD Core Math Library

*Suite of highly tuned math functions for high performance computing*

**BLAS** – Basic Linear Algebra Subprograms
- Full Level 1, 2, and 3 support
- Highly optimized DGEMM, other Level 3 BLAS.
- OpenMP support for key routines

**Lapack** – Linear Algebra package
- Uses calls to BLAS to solve linear algebra systems
- Matrix factorization/solve, eigenvalue solutions
- OpenMP support for key routines

**FFTs** – Fast Fourier Transforms
- Time-to-frequency domain
- Hand-tuned assembly
- OpenMP support for 2D, 3D transforms

**Fast/vector transcendental math library**
- 1, 2, 4, or N values per call
- Single, Double precision

**RNGs** - Random Number Generators
- Comprehensive reference implementation

*Double, Single, Single Complex, Double Complex*
ACML-GPU “Beta” Version

Features

• **BLAS library only**
  - DGEMM, SGEMM will run on GPU if present
  - Will split work between GPU, CPUs
  - Supports AMD Barcelona

• Windows 64, PGI 7.1 compiler
  - compatible with Visual Studio 2005

System requirements

• Single ATI Radeon HD 2900XT or AMD FireStream 9170 (required for double precision)
• CAL (and drivers, ATI Catalyst v7.11)
• Microsoft Visual Studio 2005 (PGI 7.1 for FORTRAN)

Available soon through FireStream Computing web page

ACML-GPU Initial Release

Q108

Full ACML library
  - Selected routines ported to GPU

Linux
  - GCC/GFORTRAN 4.2, PGI

FFTs
  - 1D CFFT and ZFFT
ACML-GPU  Further Research

BLAS routines
- ZGEMM, CGEMM
- L1, L2 routines
  - Leave-in-place API

FFTs
- 2D, 3D
- real-to-complex
- non power-of-2 radices

RNG and select LAPACK functions if they improve performance
## ACML-GPU Initial Compiler/OS Support

### Windows® 64-bit OS

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<th>Compiler</th>
<th>Version (ACML build)</th>
<th>OpenMP support</th>
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## ACML-GPU Compiler/OS Support

### Linux 64-bit OS

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