

**Workshop**  
**18 May – 19 May 2016**

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# Coverage of Workshop

- Batched BLAS
- Reproducible BLAS and reproducibility
- BLAS for different precisions
- Related Presentations
- Vendor Presentations

See: <http://bit.ly/Batch-BLAS-2016>

and the workshop report, MIMS EPrint: 2016.41

# Batched BLAS (BBLAS)

Nine presentations related to the BBLAS, covering:

- Overview of the draft specification
- Reference implementation and testing
- Use and applications of the BBLAS
- Grouping and interleaved options for the BBLAS

# BBLAS Discussion (1 of 2)

In the initial proposal, the argument *batch\_opts* can take the values **BATCH\_FIXED**, or **BATCH\_VARIABLE**, and *batchcount* indicates the number of matrices (batches) to process. The discussion included:

- When to use **BATCH\_VARIABLE**, rather than several calls to **BATCH\_FIXED**
- The effect of a large value of *batchcount*
- A grouping option for *batch\_opts*
- :

# BBLAS Discussion (2 of 2)

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- An interleaved data format
- A strided data format
- The aliasing rules
- The number of cases that need implementing
- Optional arguments (handles)
- Row stride as well as column stride (lda and tda)

There was also discussion of BBLAS versus OpenMP.

# Reproducibility

This section comprised three talks covering:

- Motivation and design for a set of Reproducible BLAS
- Reproducibility of complete programs and distributed data structures
- Projects concerned with reproducibility and replication of both software and research

# BLAS for Different Precisions

This section comprised two talks covering:

- BLAS for different precisions, including reduced precision BLAS, with a suggested naming scheme
- The existing extended precision BLAS (XBLAS), together with a proposal for a slimmed down version of the XBLAS

# The Related Presentations

This section comprised four talks covering:

- Bench-testing environment for automated software tuning (BEAST)
- The European Horizon 2020 project, NLAJET, concerned with parallel numerical linear algebra for future extreme scale systems.
- Communication avoiding algorithms for iterative methods. This is being investigated as part of the NLAJET project.
- Towards ATLAS 4.0. Described the work being done towards the next software release.



# Vendor Presentations

- Intel and MKL
- ARM and the ARM performance libraries
- NAG and the BLAS
- The MathWorks and the BLAS, including batched BLAS, the importance of reproducibility, and reduced precision BLAS
- Nvidia and the CUBLAS
- Cray and the Cray scientific and math libraries

Two of the vendors mentioned requests they have received for additional BLAS: Intel – integer versions of GEMM (IGEMM); NAG – multiplication of triangular matrices, which arises in computing matrix functions.

# Other Issues

- Is batching required for the reproducible and reduced precision BLAS?

Grateful thanks were given to the organisers, Jack and his colleagues Leighanne, Teresa and Tracy.