pyclblas Documentation

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BLAS Level 1 Functions

SWAP - Swap elements from 2 vectors

pyclblas.**clblasCswap**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasCswap

interchanges two vectors of complex-float elements.

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDswap**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDswap

interchanges two vectors of double.

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSswap**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasSswap

interchanges two vectors of float.

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZswap**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasZswap

interchanges two vectors of double-complex elements.

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SCAL - Scales a vector by a constant

pyclblas.**clblasCscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasCscal

Scales a complex-float vector by a complex-float constant.

- ($X \leftarrow \alpha X$)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*complex [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasDscal

Scales a double vector by a double constant.

- ($X \leftarrow \alpha X$)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.

- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)
wraps: clblasSscal

Scales a float vector by a float constant.

- ($X \leftarrow \alpha X$)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)
wraps: clblasZscal

Scales a complex-double vector by a complex-double constant.

- ($X \leftarrow \alpha X$)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*complex [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SSCAL - Scales a complex vector by a real constant

pyclblas.**clblasCsscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)
wraps: clblasCsscal

Scales a complex-float vector by a float constant.

•(X ← α X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZdscal**(*N*, *alpha*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)
wraps: clblasZdscal

Scales a complex-double vector by a double constant.

•(X ← α X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

COPY - Copies elements from vector X to vector Y

pyclblas.**clblasCcopy**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasCcopy

Copies complex-float elements from vector X to vector Y.

- (Y ← X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDcopy**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDcopy

Copies double elements from vector X to vector Y.

- (Y ← X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasScopy**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasScopy

Copies float elements from vector X to vector Y.

•(Y ← X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZcopy**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasZcopy

Copies complex-double elements from vector X to vector Y.

•(Y ← X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

AXPY - Scale X and add to Y

pyclblas.**clblasCaxpy**(*N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasCaxpy

Scale vector X of complex-float elements and add to Y.

•(Y $\leftarrow \alpha$ X + Y)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*complex [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDaxpy**(*N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)
wraps: clblasDaxpy

Scale vector X of double elements and add to Y.

•(Y $\leftarrow \alpha$ X + Y)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSaxpy**(*N, alpha, X, offx, incx, Y, offy, incy, commandQueues, eventWaitList*)
wraps: clblasSaxpy

Scale vector X of float elements and add to Y.

- (Y $\leftarrow \alpha$ X + Y)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*float [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZaxpy**(*N, alpha, X, offx, incx, Y, offy, incy, commandQueues, eventWaitList*)
wraps: clblasZaxpy

Scale vector X of double-complex elements and add to Y.

- (Y $\leftarrow \alpha$ X + Y)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **alpha** (*complex [in]*) – The constant factor for vector **X**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.

- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

DOT - Dot product of two vectors

pyclblas.**clblasDdot**(*N, dotProduct, offDP, X, offx, incx, Y, offy, incy, scratchBuff, commandQueues, eventWaitList*)

wraps: clblasDdot

dot product of two vectors containing double elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSdot**(*N, dotProduct, offDP, X, offx, incx, Y, offy, incy, scratchBuff, commandQueues, eventWaitList*)

wraps: clblasSdot

dot product of two vectors containing float elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasCdotu**(*N*, *dotProduct*, *offDP*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasCdotu

dot product of two vectors containing float-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZdotu**(*N*, *dotProduct*, *offDP*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasZdotu

dot product of two vectors containing double-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasCdotc**(*N*, *dotProduct*, *offDP*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasCdotc

dot product of two vectors containing float-complex elements conjugating the first vector

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.

- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZdotc**(*N*, *dotProduct*, *offDP*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasZdotc

dot product of two vectors containing double-complex elements conjugating the first vector

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **dotProduct** (*pyopencl.Buffer [out]*) – Buffer object that will contain the dot-product value.
- **offDP** (*int [in]*) – Offset to dot-product in **dotProduct** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

ROTG - Constructs givens plane rotation

pyclblas.**clblasCrotg**(*CA*, *offCA*, *CB*, *offCB*, *C*, *offC*, *S*, *offS*, *commandQueues*, *eventWaitList*)

wraps: clblasCrotg

construct givens plane rotation on float-complex elements

Parameters

- **CA** (*pyopencl.Buffer [out]*) – Buffer object that contains CA.
- **offCA** (*int [in]*) – Offset to CA in **CA** buffer object. Counted in elements.
- **CB** (*pyopencl.Buffer [out]*) – Buffer object that contains CB.
- **offCB** (*int [in]*) – Offset to CB in **CB** buffer object. Counted in elements.
- **C** (*pyopencl.Buffer [out]*) – Buffer object that contains C. C is real.
- **offC** (*int [in]*) – Offset to C in **C** buffer object. Counted in elements.
- **S** (*pyopencl.Buffer [out]*) – Buffer object that contains S.
- **offS** (*int [in]*) – Offset to S in **S** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDrotg**(*DA*, *offDA*, *DB*, *offDB*, *C*, *offC*, *S*, *offS*, *commandQueues*, *eventWaitList*)
wraps: clblasDrotg

construct givens plane rotation on double elements

Parameters

- **DA** (*pyopencl.Buffer [out]*) – Buffer object that contains DA.
- **offDA** (*int [in]*) – Offset to DA in **DA** buffer object. Counted in elements.
- **DB** (*pyopencl.Buffer [out]*) – Buffer object that contains DB.
- **offDB** (*int [in]*) – Offset to DB in **DB** buffer object. Counted in elements.
- **C** (*pyopencl.Buffer [out]*) – Buffer object that contains C.
- **offC** (*int [in]*) – Offset to C in **C** buffer object. Counted in elements.
- **S** (*pyopencl.Buffer [out]*) – Buffer object that contains S.
- **offS** (*int [in]*) – Offset to S in **S** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSrotg**(*SA*, *offSA*, *SB*, *offSB*, *C*, *offC*, *S*, *offS*, *commandQueues*, *eventWaitList*)
wraps: clblasSrotg

construct givens plane rotation on float elements

Parameters

- **SA** (*pyopencl.Buffer [out]*) – Buffer object that contains SA.
- **offSA** (*int [in]*) – Offset to SA in **SA** buffer object. Counted in elements.

- **SB** (*pyopencl.Buffer [out]*) – Buffer object that contains SB.
- **offSB** (*int [in]*) – Offset to SB in **SB** buffer object. Counted in elements.
- **C** (*pyopencl.Buffer [out]*) – Buffer object that contains C.
- **offC** (*int [in]*) – Offset to C in **C** buffer object. Counted in elements.
- **S** (*pyopencl.Buffer [out]*) – Buffer object that contains S.
- **offS** (*int [in]*) – Offset to S in **S** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZrotg**(*CA*, *offCA*, *CB*, *offCB*, *C*, *offC*, *S*, *offS*, *commandQueues*, *eventWaitList*)

wraps: clblasZrotg

construct givens plane rotation on double-complex elements

Parameters

- **CA** (*pyopencl.Buffer [out]*) – Buffer object that contains CA.
- **offCA** (*int [in]*) – Offset to CA in **CA** buffer object. Counted in elements.
- **CB** (*pyopencl.Buffer [out]*) – Buffer object that contains CB.
- **offCB** (*int [in]*) – Offset to CB in **CB** buffer object. Counted in elements.
- **C** (*pyopencl.Buffer [out]*) – Buffer object that contains C. C is real.
- **offC** (*int [in]*) – Offset to C in **C** buffer object. Counted in elements.
- **S** (*pyopencl.Buffer [out]*) – Buffer object that contains S.
- **offS** (*int [in]*) – Offset to S in **S** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

ROTMG - Constructs the modified givens rotation

pyclblas.**clblasDrotmg**(*DD1*, *offDD1*, *DD2*, *offDD2*, *DX1*, *offDX1*, *DY1*, *offDY1*, *DPARAM*, *offDparam*, *commandQueues*, *eventWaitList*)

wraps: clblasDrotmg

construct the modified givens rotation on double elements

Parameters

- **DD1** (*pyopencl.Buffer [out]*) – Buffer object that contains DD1.
- **offDD1** (*int [in]*) – Offset to DD1 in **DD1** buffer object. Counted in elements.
- **DD2** (*pyopencl.Buffer [out]*) – Buffer object that contains DD2.

- **offDD2** (*int [in]*) – Offset to DD2 in **DD2** buffer object. Counted in elements.
- **DX1** (*pyopencl.Buffer [out]*) – Buffer object that contains DX1.
- **offDX1** (*int [in]*) – Offset to DX1 in **DX1** buffer object. Counted in elements.
- **DY1** (*pyopencl.Buffer [in]*) – Buffer object that contains DY1.
- **offDY1** (*int [in]*) – Offset to DY1 in **DY1** buffer object. Counted in elements.
- **DPARAM** (*pyopencl.Buffer [out]*) – Buffer object that contains DPARAM array of minimum length 5 DPARAM(0) = DFLAG DPARAM(1) = DH11 DPARAM(2) = DH21 DPARAM(3) = DH12 DPARAM(4) = DH22.
- **offDparam** (*int [in]*) – Offset to DPARAM in **DPARAM** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSrotmg**(*SD1*, *offSD1*, *SD2*, *offSD2*, *SX1*, *offSX1*, *SY1*, *offSY1*, *SPARAM*, *offSparam*, *commandQueues*, *eventWaitList*)

wraps: clblasSrotmg

construct the modified givens rotation on float elements

Parameters

- **SD1** (*pyopencl.Buffer [out]*) – Buffer object that contains SD1.
- **offSD1** (*int [in]*) – Offset to SD1 in **SD1** buffer object. Counted in elements.
- **SD2** (*pyopencl.Buffer [out]*) – Buffer object that contains SD2.
- **offSD2** (*int [in]*) – Offset to SD2 in **SD2** buffer object. Counted in elements.
- **SX1** (*pyopencl.Buffer [out]*) – Buffer object that contains SX1.
- **offSX1** (*int [in]*) – Offset to SX1 in **SX1** buffer object. Counted in elements.
- **SY1** (*pyopencl.Buffer [in]*) – Buffer object that contains SY1.
- **offSY1** (*int [in]*) – Offset to SY1 in **SY1** buffer object. Counted in elements.
- **SPARAM** (*pyopencl.Buffer [out]*) – Buffer object that contains SPARAM array of minimum length 5 SPARAM(0) = SFLAG SPARAM(1) = SH11 SPARAM(2) = SH21 SPARAM(3) = SH12 SPARAM(4) = SH22.
- **offSparam** (*int [in]*) – Offset to SPARAM in **SPARAM** buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

ROT - Apply givens rotation

pyclblas.**clblasDrot**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *C*, *S*, *commandQueues*, *eventWaitList*)

wraps: clblasDrot

applies a plane rotation for double elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **C** (*float [in]*) – C specifies the cosine, cos.
- **S** (*float [in]*) – S specifies the sine, sin.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSrot**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *C*, *S*, *commandQueues*, *eventWaitList*)

wraps: clblasSrot

applies a plane rotation for float elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **C** (*float [in]*) – C specifies the cosine, cos.
- **S** (*float [in]*) – S specifies the sine, sin.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasCsrot** (*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *C*, *S*, *commandQueues*, *eventWaitList*)
wraps: clblasCsrot

applies a plane rotation for float-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **C** (*float [in]*) – C specifies the cosine, cos. This number is real.
- **S** (*float [in]*) – S specifies the sine, sin. This number is real.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZdrot** (*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *C*, *S*, *commandQueues*, *eventWaitList*)
wraps: clblasZdrot

applies a plane rotation for double-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **C** (*float [in]*) – C specifies the cosine, cos. This number is real.
- **S** (*float [in]*) – S specifies the sine, sin. This number is real.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

ROTM - Apply modified givens rotation for points in the plane

pyclblas.**clblasDrotm**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *DPARAM*, *offDparam*, *commandQueues*, *eventWaitList*)

wraps: clblasDrotm

modified givens rotation for double elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **DPARAM** (*pyopencl.Buffer [in]*) – Buffer object that contains SPARAM array of minimum length 5 DPARAM(1)=DFLAG DPARAM(2)=DH11 DPARAM(3)=DH21 DPARAM(4)=DH12 DPARAM(5)=DH22.
- **offDparam** (*int [in]*) – Offset of first element of array **DPARAM** in buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSrotm**(*N*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *SPARAM*, *offSparam*, *commandQueues*, *eventWaitList*)

wraps: clblasSrotm

modified givens rotation for float elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X** and **Y**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.

- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **SPARAM** (*pyopencl.Buffer [in]*) – Buffer object that contains SPARAM array of minimum length 5 SPARAM(1)=SFLAG SPARAM(2)=SH11 SPARAM(3)=SH21 SPARAM(4)=SH12 SPARAM(5)=SH22.
- **offSparam** (*int [in]*) – Offset of first element of array **SPARAM** in buffer object. Counted in elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

NRM2 - Euclidean norm of a vector

pyclblas.**clblasDnrm2**(*N*, *NRM2*, *offNRM2*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasDnrm2

computes the euclidean norm of vector containing double elements NRM2 = sqrt(X' * X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **NRM2** (*pyopencl.Buffer [out]*) – Buffer object that will contain the NRM2 value.
- **offNRM2** (*int [in]*) – Offset to NRM2 value in **NRM2** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object that can hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSnrm2**(*N*, *NRM2*, *offNRM2*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasSnrm2

computes the euclidean norm of vector containing float elements NRM2 = sqrt(X' * X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **NRM2** (*pyopencl.Buffer [out]*) – Buffer object that will contain the NRM2 value.
- **offNRM2** (*int [in]*) – Offset to NRM2 value in **NRM2** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object that can hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasScnrm2**(*N*, *NRM2*, *offNRM2*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasScnrm2

computes the euclidean norm of vector containing float-complex elements NRM2 = sqrt(X**H * X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **NRM2** (*pyopencl.Buffer [out]*) – Buffer object that will contain the NRM2 value. Note that the answer of Scnrm2 is a real value.
- **offNRM2** (*int [in]*) – Offset to NRM2 value in **NRM2** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object that can hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDznrm2**(*N*, *NRM2*, *offNRM2*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasDznrm2

computes the euclidean norm of vector containing double-complex elements NRM2 = sqrt(X**H * X)

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **NRM2** (*pyopencl.Buffer [out]*) – Buffer object that will contain the NRM2 value. Note that the answer of Dznrm2 is a real value.
- **offNRM2** (*int [in]*) – Offset to NRM2 value in **NRM2** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object that can hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

iAMAX - Index of max absolute value

pyclblas.**clblasiSamax**(*N*, *iMax*, *offiMax*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasiSamax

index of max absolute value in a float array

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **iMax** (*pyopencl.Buffer [out]*) – Buffer object storing the index of first absolute max. The index will be of type unsigned int.
- **offiMax** (*int [in]*) – Offset for storing index in the buffer iMax Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temprory cl_mem object to store intermediate results It should be able to hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasiDamax**(*N*, *iMax*, *offiMax*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasiDamax

index of max absolute value in a double array

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **iMax** (*pyopencl.Buffer [out]*) – Buffer object storing the index of first absolute max. The index will be of type unsigned int.
- **offiMax** (*int [in]*) – Offset for storing index in the buffer iMax Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temprory cl_mem object to store intermediate results It should be able to hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasiCamax**(*N*, *iMax*, *offiMax*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasiCamax

index of max absolute value in a complex float array

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **iMax** (*pyopencl.Buffer [out]*) – Buffer object storing the index of first absolute max. The index will be of type unsigned int.
- **offiMax** (*int [in]*) – Offset for storing index in the buffer iMax Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temprory cl_mem object to store intermediate results It should be able to hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasiZamax**(*N*, *iMax*, *offiMax*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasiZamax

index of max absolute value in a complex double array

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **iMax** (*pyopencl.Buffer [out]*) – Buffer object storing the index of first absolute max. The index will be of type unsigned int.
- **offiMax** (*int [in]*) – Offset for storing index in the buffer iMax Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temprory cl_mem object to store intermediate results It should be able to hold minimum of (2*N) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

ASUM - Sum of absolute values

pyclblas.**clblasDasum**(*N*, *asum*, *offAsum*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasDasum

absolute sum of values of a vector containing double elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **asum** (*pyopencl.Buffer [out]*) – Buffer object that will contain the absoulte sum value.
- **offAsum** (*int [in]*) – Offset to absoule sum in **asum** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSasum**(*N*, *asum*, *offAsum*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasSasum

absolute sum of values of a vector containing float elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **asum** (*pyopencl.Buffer [out]*) – Buffer object that will contain the absoule sum value.
- **offAsum** (*int [in]*) – Offset to absolute sum in **asum** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasScasum**(*N*, *asum*, *offAsum*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasScasum

absolute sum of values of a vector containing float-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.
- **asum** (*pyopencl.Buffer [out]*) – Buffer object that will contain the absolute sum value.
- **offAsum** (*int [in]*) – Offset to absolute sum in **asum** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDzasum**(*N*, *asum*, *offAsum*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)
wraps: clblasDzasum

absolute sum of values of a vector containing double-complex elements

Parameters

- **N** (*int [in]*) – Number of elements in vector **X**.

- **asum** (*pyopencl.Buffer [out]*) – Buffer object that will contain the absolute sum value.
- **offAsum** (*int [in]*) – Offset to absolute sum in **asum** buffer object. Counted in elements.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object of minimum size N.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

BLAS Level 2 Functions

GEMV - General matrix-Vector multiplication

pyclblas.**clblasCgemv**(*order*, *transA*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasCgemv

Matrix-vector product with a general rectangular matrix and float complex elements. Extended version. Matrix-vector products:

- (y ← α A x + β y)
- (y ← α A^Tx + β y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.

- **incx** (*int [in]*) – Increment for the elements of **x**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of the vector **y**.
- **y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDgemv**(*order*, *transA*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDgemv

Matrix-vector product with a general rectangular matrix and double elements. Extended version. Matrix-vector products:

- ($y \leftarrow \alpha$ A x + β y)
- ($y \leftarrow \alpha$ A^Tx + β y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **x**. It cannot be zero.
- **beta** (*float [in]*) – The factor of the vector **y**.
- **y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSgemv**(*order*, *transA*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasSgemv

Matrix-vector product with a general rectangular matrix and float elements. Extended version. Matrix-vector products:

- ($y \leftarrow \alpha A x + \beta y$)
- ($y \leftarrow \alpha A^T x + \beta y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **x**. It cannot be zero.
- **beta** (*float [in]*) – The factor of the vector **y**.
- **y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZgemv**(*order*, *transA*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasZgemv

Matrix-vector product with a general rectangular matrix and double complex elements. Extended version. Matrix-vector products:

- ($y \leftarrow \alpha$ A x + β y)
- ($y \leftarrow \alpha$ A^Tx + β y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **x**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of the vector **y**.
- **y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYMV - Symmetric matrix-Vector multiplication

pyclblas.**clblasDsymv**(*order*, *uplo*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDsymv

Matrix-vector product with a symmetric matrix and double elements. Matrix-vector products:

- ($y \leftarrow \alpha$ A x + β y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.

- **N** (*int [in]*) – Number of rows and columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot less than **N**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **x**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **y**.
- **y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsymv**(*order*, *uplo*, *N*, *alpha*, *A*, *offA*, *lda*, *x*, *offx*, *incx*, *beta*, *y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasSsymv

Matrix-vector product with a symmetric matrix and float elements. Matrix-vector products:

- ($y \leftarrow \alpha A x + \beta y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot less than **N**.
- **x** (*pyopencl.Buffer [in]*) – Buffer object storing vector **x**.
- **offx** (*int [in]*) – Offset of first element of vector **x** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **x**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **y**.

- **y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HEMV - Hermitian matrix-vector multiplication

pyclblas.**clblasChemv**(*order*, *uplo*, *N*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasChemv

Matrix-vector product with a hermitian matrix and float-complex elements. Matrix-vector products:

- ($Y \leftarrow \alpha A X + \beta Y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot less than **N**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasZhemv`**(*order*, *uplo*, *N*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasZhemv

Matrix-vector product with a hermitian matrix and double-complex elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot less than **N**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TRMV - Triangular matrix vector multiply

`pyclblas.`**`clblasCtrmv`**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasCtrmv

Matrix-vector product with a triangular matrix and float complex elements. Matrix-vector products:

- (X $\leftarrow$ A X)
- (X $\leftarrow$ A^TX)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.

- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtrmv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasDtrmv

Matrix-vector product with a triangular matrix and double elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStrmv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasStrmv

Matrix-vector product with a triangular matrix and float elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtrmv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasZtrmv

Matrix-vector product with a triangular matrix and double complex elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.

- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TRSV - Triangular matrix vector Solve

pyclblas.**clblasCtrsv**(*order, uplo, trans, diag, N, A, offa, lda, X, offx, incx, commandQueues, eventWaitList*)

wraps: clblasCtrsv

solving triangular matrix problems with float-complex elements. Matrix-vector products:

- (A X $\leftarrow$ X)
- (A^TX $\leftarrow$ X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtrsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasDtrsv

solving triangular matrix problems with double elements. Matrix-vector products:

- (A X $\leftarrow$ X)
- (A^TX $\leftarrow$ X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStrsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasStrsv

solving triangular matrix problems with float elements. Matrix-vector products:

- (A X $\leftarrow$ X)
- (A^TX $\leftarrow$ X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.

- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtrsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasZtrsv

solving triangular matrix problems with double-complex elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

GER - General matrix rank 1 operation

pyclblas.**clblasDger**(*order*, *M*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasDger

vector-vector product with double elements and performs the rank 1 operation A Vector-vector products:

- ($A \leftarrow \alpha X Y^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – specifies the scalar alpha.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSger**(*order*, *M*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasSger

vector-vector product with float elements and performs the rank 1 operation A Vector-vector products:

- ($A \leftarrow \alpha X Y^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – specifies the scalar alpha.

- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

GERU - General matrix rank 1 operation

pyclblas.**clblasCgeru**(*order, M, N, alpha, X, offx, incx, Y, offy, incy, A, offa, lda, commandQueues, eventWaitList*)

wraps: clblasCgeru

vector-vector product with float complex elements and performs the rank 1 operation A Vector-vector products:

•($A \leftarrow \alpha X Y^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – specifies the scalar alpha.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.

- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZgeru**(*order*, *M*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasZgeru

vector-vector product with double complex elements and performs the rank 1 operation A Vector-vector products:

- ($A \leftarrow \alpha X Y^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – specifies the scalar alpha.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

GERC - General matrix rank 1 operation

pyclblas.**clblasCgerc**(*order*, *M*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasCgerc

vector-vector product with float complex elements and performs the rank 1 operation A Vector-vector products:

- ($A \leftarrow \alpha$ X Y^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – specifies the scalar alpha.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZgerc**(*order*, *M*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasZgerc

vector-vector product with double complex elements and performs the rank 1 operation A Vector-vector products:

- ($A \leftarrow \alpha$ X Y^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **A**.

- **alpha** (*complex [in]*) – specifies the scalar alpha.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**. On exit, A is overwritten by the updated matrix.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYR - Symmetric rank 1 update

pyclblas.**clblasDsyr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasDsyr

Symmetric rank 1 operation with a general triangular matrix and double elements. Symmetric rank 1 operation:

- ($A \leftarrow \alpha \, x \, x^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of first element of matrix **A** in buffer object.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsyr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)
wraps: clblasSsyr

Symmetric rank 1 operation with a general triangular matrix and float elements. Symmetric rank 1 operation:

•(A $\leftarrow \alpha$ x x^T+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of first element of matrix **A** in buffer object.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HER - Hermitian rank 1 operation

pyclblas.**clblasCher**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)
wraps: clblasCher

hermitian rank 1 operation with a general triangular matrix and float-complex elements. hermitian rank 1 operation:

•(A $\leftarrow \alpha$ X X^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A** (a scalar float value).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.

- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZher**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasZher

hermitian rank 1 operation with a general triangular matrix and double-complex elements. hermitian rank 1 operation:

•($A \leftarrow \alpha X X^H + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A** (a scalar double value).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYR2 - Symmetric rank 2 update

pyclblas.**clblasDsyr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasDsyr2

Symmetric rank 2 operation with a general triangular matrix and double elements. Symmetric rank 2 operation:

•($A \leftarrow \alpha x y^T + \alpha y x^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of first element of matrix **A** in buffer object.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsyr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasSsyr2

Symmetric rank 2 operation with a general triangular matrix and float elements. Symmetric rank 2 operation:

- ($A \leftarrow \alpha\ x\ y^T + \alpha\ y\ x^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of first element of matrix **A** in buffer object.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HER2 - Hermitian rank 2 update

pyclblas.**clblasCher2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasCher2

Hermitian rank 2 operation with a general triangular matrix and float-compelx elements. Hermitian rank 2 operation:

- $(A \leftarrow \alpha X Y^H + conj\{ \alpha \} Y X^H + A)$

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZher2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *A*, *offa*, *lda*, *commandQueues*, *eventWaitList*)

wraps: clblasZher2

Hermitian rank 2 operation with a general triangular matrix and double-compelx elements. Hermitian rank 2 operation:

- $(A \leftarrow \alpha X Y^H + conj\{ \alpha \} Y X^H + A)$

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **A** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TPMV - Triangular packed matrix-vector multiply

pyclblas.**clblasCtpmv**(*order*, *uplo*, *trans*, *diag*, *N*, *AP*, *offa*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasCtpmv

Matrix-vector product with a packed triangular matrix and float-complex elements. Matrix-vector products:

- (X ← A X)
- (X ← A^TX)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **AP** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **AP** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP** in packed format.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.

- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtpmv**(*order*, *uplo*, *trans*, *diag*, *N*, *AP*, *offa*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasDtpmv

Matrix-vector product with a packed triangular matrix and double elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **AP** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **AP** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP** in packed format.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStpmv**(*order*, *uplo*, *trans*, *diag*, *N*, *AP*, *offa*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasStpmv

Matrix-vector product with a packed triangular matrix and float elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **AP** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **AP** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP** in packed format.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtpmv**(*order*, *uplo*, *trans*, *diag*, *N*, *AP*, *offa*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasZtpmv

Matrix-vector product with a packed triangular matrix and double-complex elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **AP** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **AP** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP** in packed format.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TPSV - Triangular packed matrix vector solve

pyclblas.**clblasCtpsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasCtpsv

solving triangular packed matrix problems with float complex elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix in packed format. **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtpsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasDtpsv

solving triangular packed matrix problems with double elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.

- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix in packed format. **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStpsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasStpsv

solving triangular packed matrix problems with float elements. Matrix-vector products:

- (A X $\leftarrow$ X)
- (A^TX $\leftarrow$ X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix in packed format. **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtpsv**(*order*, *uplo*, *trans*, *diag*, *N*, *A*, *offa*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasZtpsv

solving triangular packed matrix problems with double complex elements. Matrix-vector products:

- (A X $\leftarrow$ X)

•($A^T X \leftarrow X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix in packed format. **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SPMV - Symmetric packed matrix vector multiply

pyclblas.**clblasDspmv**(*order*, *uplo*, *N*, *alpha*, *AP*, *offa*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDspmv

Matrix-vector product with a symmetric packed-matrix and double elements. Matrix-vector products:

•($Y \leftarrow \alpha A X + \beta Y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **AP**.
- **alpha** (*float [in]*) – The factor of matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.

- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSspmv**(*order*, *uplo*, *N*, *alpha*, *AP*, *offa*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasSspmv

Matrix-vector product with a symmetric packed-matrix and float elements. Matrix-vector products:

- ($Y \leftarrow \alpha A X + \beta Y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **AP**.
- **alpha** (*float [in]*) – The factor of matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HPMV - Hermitian packed matrix-vector multiplication

pyclblas.**clblasChpmv**(*order*, *uplo*, *N*, *alpha*, *AP*, *offa*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasChpmv

Matrix-vector product with a packed hermitian matrix and float-complex elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **AP**.
- **alpha** (*complex [in]*) – The factor of matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing packed matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZhpmv**(*order*, *uplo*, *N*, *alpha*, *AP*, *offa*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasZhpmv

Matrix-vector product with a packed hermitian matrix and double-complex elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in matrix **AP**.
- **alpha** (*complex [in]*) – The factor of matrix **AP**.
- **AP** (*pyopencl.Buffer [in]*) – Buffer object storing packed matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **AP**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.

- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SPR - Symmetric packed matrix rank 1 update

pyclblas.**clblasDspr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasDspr

Symmetric rank 1 operation with a general triangular packed-matrix and double elements. Symmetric rank 1 operation:

- ($A \leftarrow \alpha X X^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.
- **offa** (*int [in]*) – Offset of first element of matrix **AP** in buffer object.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSspr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasSspr

Symmetric rank 1 operation with a general triangular packed-matrix and float elements. Symmetric rank 1 operation:

- ($A \leftarrow \alpha X X^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.
- **offa** (*int [in]*) – Offset of first element of matrix **AP** in buffer object.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HPR - Hermitian packed matrix rank 1 update

pyclblas.**clblasChpr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasChpr

hermitian rank 1 operation with a general triangular packed-matrix and float-complex elements. hermitian rank 1 operation:

- ($A \leftarrow \alpha X X^H + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A** (a scalar float value).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **AP**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZhpr**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *AP*, *offa*, *commandQueues*, *eventWaitList*)
wraps: clblasZhpr

hermitian rank 1 operation with a general triangular packed-matrix and double-complex elements. hermitian rank 1 operation:

•(A ← α X X^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A** (a scalar float value).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **AP**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SPR2 - Symmetric packed matrix rank 2 update

pyclblas.**clblasDspr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *AP*, *offa*, *commandQueues*, *eventWaitList*)
wraps: clblasDspr2

Symmetric rank 2 operation with a general triangular packed-matrix and double elements. Symmetric rank 2 operation:

•(A ← α X Y^T+ α Y X^T+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object.

- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.
- **offa** (*int [in]*) – Offset of first element of matrix **AP** in buffer object.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSspr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasSspr2

Symmetric rank 2 operation with a general triangular packed-matrix and float elements. Symmetric rank 2 operation:

- ($A \leftarrow \alpha X Y^T + \alpha Y X^T + A$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.
- **offa** (*int [in]*) – Offset of first element of matrix **AP** in buffer object.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HPR2 - Hermitian packed matrix rank 2 update

pyclblas.**clblasChpr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasChpr2

Hermitian rank 2 operation with a general triangular packed-matrix and float-compelx elements. Hermitian rank 2 operation:

•(A $\leftarrow \alpha$ X Y^H+ conj(alpha) Y X^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **AP**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZhpr2**(*order*, *uplo*, *N*, *alpha*, *X*, *offx*, *incx*, *Y*, *offy*, *incy*, *AP*, *offa*, *commandQueues*, *eventWaitList*)

wraps: clblasZhpr2

Hermitian rank 2 operation with a general triangular packed-matrix and double-compelx elements. Hermitian rank 2 operation:

•(A $\leftarrow \alpha$ X Y^H+ conj(alpha) Y X^H+ A)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of columns in matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for the first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **Y** (*pyopencl.Buffer [in]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset in number of elements for the first element in vector **Y**.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **AP** (*pyopencl.Buffer [out]*) – Buffer object storing packed-matrix **AP**.

- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **AP**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

GBMV - General banded matrix-vector multiplication

pyclblas.**clblasCgbmv**(*order*, *trans*, *M*, *N*, *KL*, *KU*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasCgbmv

Matrix-vector product with a general rectangular banded matrix and float-complex elements. Matrix-vector products:

- ($Y \leftarrow \alpha A X + \beta Y$)
- ($Y \leftarrow \alpha A^T X + \beta Y$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in banded matrix **A**.
- **N** (*int [in]*) – Number of columns in banded matrix **A**.
- **KL** (*int [in]*) – Number of sub-diagonals in banded matrix **A**.
- **KU** (*int [in]*) – Number of super-diagonals in banded matrix **A**.
- **alpha** (*complex [in]*) – The factor of banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing banded matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in banded matrix **A**.
- **lda** (*int [in]*) – Leading dimension of banded matrix **A**. It cannot be less than (**KL** + **KU** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **beta** (*complex [in]*) – The factor of the vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDgbmv**(*order*, *trans*, *M*, *N*, *KL*, *KU*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDgbmv

Matrix-vector product with a general rectangular banded matrix and double elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)
- (Y $\leftarrow \alpha$ A^{T}X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in banded matrix **A**.
- **N** (*int [in]*) – Number of columns in banded matrix **A**.
- **KL** (*int [in]*) – Number of sub-diagonals in banded matrix **A**.
- **KU** (*int [in]*) – Number of super-diagonals in banded matrix **A**.
- **alpha** (*float [in]*) – The factor of banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing banded matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in banded matrix **A**.
- **lda** (*int [in]*) – Leading dimension of banded matrix **A**. It cannot be less than (**KL** + **KU** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **beta** (*float [in]*) – The factor of the vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSgbmv**(*order*, *trans*, *M*, *N*, *KL*, *KU*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasSgbmv

Matrix-vector product with a general rectangular banded matrix and float elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)
- (Y $\leftarrow \alpha$ A^TX + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in banded matrix **A**.
- **N** (*int [in]*) – Number of columns in banded matrix **A**.
- **KL** (*int [in]*) – Number of sub-diagonals in banded matrix **A**.
- **KU** (*int [in]*) – Number of super-diagonals in banded matrix **A**.
- **alpha** (*float [in]*) – The factor of banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing banded matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in banded matrix **A**.
- **lda** (*int [in]*) – Leading dimension of banded matrix **A**. It cannot be less than (**KL** + **KU** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **beta** (*float [in]*) – The factor of the vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZgbmv**(*order*, *trans*, *M*, *N*, *KL*, *KU*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasZgbmv

Matrix-vector product with a general rectangular banded matrix and double-complex elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)
- (Y $\leftarrow \alpha$ A^TX + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **M** (*int [in]*) – Number of rows in banded matrix **A**.
- **N** (*int [in]*) – Number of columns in banded matrix **A**.
- **KL** (*int [in]*) – Number of sub-diagonals in banded matrix **A**.
- **KU** (*int [in]*) – Number of super-diagonals in banded matrix **A**.
- **alpha** (*complex [in]*) – The factor of banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing banded matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in banded matrix **A**.
- **lda** (*int [in]*) – Leading dimension of banded matrix **A**. It cannot be less than (**KL** + **KU** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **beta** (*complex [in]*) – The factor of the vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing the vector **y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of **Y**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TBMV - Triangular banded matrix vector multiply

pyclblas.**clblasCtbmv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasCtbmv

Matrix-vector product with a triangular banded matrix and float-complex elements. Matrix-vector products:

- (X ← A X)
- (X ← A^TX)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.

- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtbmv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasDtbmv

Matrix-vector product with a triangular banded matrix and double elements. Matrix-vector products:

- ($X \leftarrow A X$)
- ($X \leftarrow A^T X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStbmv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasStbmv

Matrix-vector product with a triangular banded matrix and float elements. Matrix-vector products:

- (X ← A X)
- (X ← A^TX)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtbmv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *scratchBuff*, *commandQueues*, *eventWaitList*)

wraps: clblasZtbmv

Matrix-vector product with a triangular banded matrix and double-complex elements. Matrix-vector products:

- (X ← A X)
- (X ← A^TX)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **scratchBuff** (*pyopencl.Buffer [in]*) – Temporary cl_mem scratch buffer object which can hold a minimum of (1 + (N-1)*abs(incx)) elements.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SBMV - Symmetric banded matrix-vector multiplication

pyclblas.**clblasDsbmv**(*order*, *uplo*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasDsbmv

Matrix-vector product with a symmetric banded matrix and double elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in banded matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.

- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsbmv**(*order*, *uplo*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasSsbmv

Matrix-vector product with a symmetric banded matrix and float elements. Matrix-vector products:

- (Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in banded matrix **A**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*float [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HBMV - Hermitian banded matrix-vector multiplication

pyclblas.**clblasChbmv**(*order*, *uplo*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasChbmv

Matrix-vector product with a hermitian banded matrix and float elements. Matrix-vector products:

•(Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in banded matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZhbmv**(*order*, *uplo*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *beta*, *Y*, *offy*, *incy*, *commandQueues*, *eventWaitList*)

wraps: clblasZhbmv

Matrix-vector product with a hermitian banded matrix and double elements. Matrix-vector products:

•(Y $\leftarrow \alpha$ A X + β Y)

Parameters

- **order** (*clblasOrder [in]*) – Row/columns order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **N** (*int [in]*) – Number of rows and columns in banded matrix **A**.

- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in banded matrix **A**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [in]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset of first element of vector **X** in buffer object. Counted in elements.
- **incx** (*int [in]*) – Increment for the elements of vector **X**. It cannot be zero.
- **beta** (*complex [in]*) – The factor of vector **Y**.
- **Y** (*pyopencl.Buffer [out]*) – Buffer object storing vector **Y**.
- **offy** (*int [in]*) – Offset of first element of vector **Y** in buffer object. Counted in elements.
- **incy** (*int [in]*) – Increment for the elements of vector **Y**. It cannot be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TBSV - Solving triangular banded matrix

pyclblas.**clblasCtbsv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasCtbsv

solving triangular banded matrix problems with float-complex elements. Matrix-vector products:

- ($A X \leftarrow X$)
- ($A^T X \leftarrow X$)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.

- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDtbsv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasDtbsv

solving triangular banded matrix problems with double elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStbsv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasStbsv

solving triangular banded matrix problems with float elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtbsv**(*order*, *uplo*, *trans*, *diag*, *N*, *K*, *A*, *offa*, *lda*, *X*, *offx*, *incx*, *commandQueues*, *eventWaitList*)

wraps: clblasZtbsv

solving triangular banded matrix problems with double-complex elements. Matrix-vector products:

- (A X ← X)
- (A^TX ← X)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix **A** is unit triangular.
- **N** (*int [in]*) – Number of rows/columns in banded matrix **A**.
- **K** (*int [in]*) – Number of sub-diagonals/super-diagonals in triangular banded matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than (**K** + 1).
- **X** (*pyopencl.Buffer [out]*) – Buffer object storing vector **X**.
- **offx** (*int [in]*) – Offset in number of elements for first element in vector **X**.
- **incx** (*int [in]*) – Increment for the elements of **X**. Must not be zero.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

BLAS Level 3 Functions

GEMM - General matrix-matrix multiplication

pyclblas.**clblasCgemm**(*order*, *transA*, *transB*, *M*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasCgemm

Matrix-matrix product of general rectangular matrices with float complex elements. Extended version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Matrix-matrix products:

- (C ← α A B + β C)
- (C ← α A^TB + β C)
- (C ← α A B^T+ β C)
- (C ← α $A^T B^T$+ β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **transB** (*clblasTranspose [in]*) – How matrix **B** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **K** (*int [in]*) – Number of columns in matrix **A** and rows in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.

- **ldc** (*int [in]*) – Leading dimension of matrix **C**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDgemm**(*order*, *transA*, *transB*, *M*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasDgemm

Matrix-matrix product of general rectangular matrices with double elements. Extended version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Matrix-matrix products:

- ($C \leftarrow \alpha$ A B + β C)
- ($C \leftarrow \alpha$ $A^T B$ + β C)
- ($C \leftarrow \alpha$ A B^T+ β C)
- ($C \leftarrow \alpha$ $A^T B^T$+ β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **transB** (*clblasTranspose [in]*) – How matrix **B** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **K** (*int [in]*) – Number of columns in matrix **A** and rows in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*float [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSgemm**(*order*, *transA*, *transB*, *M*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasSgemm

Matrix-matrix product of general rectangular matrices with float elements. Extended version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Matrix-matrix products:

- ($C \leftarrow \alpha$ A B + β C)
- ($C \leftarrow \alpha$ A^TB + β C)
- ($C \leftarrow \alpha$ A B^T+ β C)
- ($C \leftarrow \alpha$ $A^T B^T$+ β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **transB** (*clblasTranspose [in]*) – How matrix **B** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **K** (*int [in]*) – Number of columns in matrix **A** and rows in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when the parameter is set to **clblasColumnMajor**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **K** when it is set to **clblasColumnMajor**.
- **beta** (*float [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZgemm**(*order*, *transA*, *transB*, *M*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZgemm

Matrix-matrix product of general rectangular matrices with double complex elements. Exteneded version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Matrix-matrix products:

- (C $\leftarrow \alpha$ A B + β C)
- (C $\leftarrow \alpha$ A^TB + β C)
- (C $\leftarrow \alpha$ A B^T+ β C)
- (C $\leftarrow \alpha$ $A^T B^T$+ β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **transB** (*clblasTranspose [in]*) – How matrix **B** is to be transposed.
- **M** (*int [in]*) – Number of rows in matrix **A**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **K** (*int [in]*) – Number of columns in matrix **A** and rows in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TRMM - Triangular matrix-matrix multiplication

pyclblas.**clblasCtrmm**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasCtrmm

Multiplying a matrix by a triangular matrix with float complex elements. Extended version. Matrix-triangular matrix products:

- (B $\leftarrow \alpha$ A B)
- (B $\leftarrow \alpha$ A^{T}B)
- (B $\leftarrow \alpha$ B A)
- (B $\leftarrow \alpha$ B A^T)

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasDtrmm`**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasDtrmm

Multiplying a matrix by a triangular matrix with double elements. Extended version. Matrix-triangular matrix products:

- (B $\leftarrow \alpha$ A B)
- (B $\leftarrow \alpha$ A^TB)
- (B $\leftarrow \alpha$ B A)
- (B $\leftarrow \alpha$ B A^T)

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasStrmm`**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasStrmm

Multiplying a matrix by a triangular matrix with float elements. Extended version. Matrix-triangular matrix products:

- (B $\leftarrow \alpha$ A B)
- (B $\leftarrow \alpha$ A^TB)

- (B $\leftarrow \alpha$ B A)
- (B $\leftarrow \alpha$ B A^T)

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when it is set to **clblasRight**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or not less than **M** when it is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtrmm**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasZtrmm

Multiplying a matrix by a triangular matrix with double complex elements. Extended version. Matrix-triangular matrix products:

- (B $\leftarrow \alpha$ A B)
- (B $\leftarrow \alpha$ A^TB)
- (B $\leftarrow \alpha$ B A)
- (B $\leftarrow \alpha$ B A^T)

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

TRSM - Solving triangular systems of equations

pyclblas.**clblasCtrsm**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasCtrsm

Solving triangular systems of equations with multiple right-hand sides and float complex elements. Extended version. Solving triangular systems of equations:

- (B $\leftarrow \alpha$ A^{-1}B)
- (B $\leftarrow \alpha$ A^{-T} B)
- (B $\leftarrow \alpha$ B A^{-1})
- (B $\leftarrow \alpha$ B A^{-T})

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.

- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasDtrsm`**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasDtrsm

Solving triangular systems of equations with multiple right-hand sides and double elements. Extended version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Solving triangular systems of equations:

- (B $\leftarrow \alpha$ A^{-1}B)
- (B $\leftarrow \alpha$ A^{-T} B)
- (B $\leftarrow \alpha$ B A^{-1})
- (B $\leftarrow \alpha$ B A^{-T})

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.

- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasStrsm**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasStrsm

Solving triangular systems of equations with multiple right-hand sides and float elements. Extended version. <dl class="section note"> <dt> Note </dt> <dd> This function is not thread-safe. </dd> </dl> Solving triangular systems of equations:

- (B $\leftarrow \alpha$ A^{-1}B)
- (B $\leftarrow \alpha$ A^{-T} B)
- (B $\leftarrow \alpha$ B A^{-1})
- (B $\leftarrow \alpha$ B A^{-T})

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when it is set to **clblasRight**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.

- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZtrsm**(*order*, *side*, *uplo*, *transA*, *diag*, *M*, *N*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *commandQueues*, *eventWaitList*)

wraps: clblasZtrsm

Solving triangular systems of equations with multiple right-hand sides and double complex elements. Extended version. Solving triangular systems of equations:

- (B $\leftarrow \alpha$ A^{-1}B)
- (B $\leftarrow \alpha$ A^{-T} B)
- (B $\leftarrow \alpha$ B A^{-1})
- (B $\leftarrow \alpha$ B A^{-T})

where **T** is an upper or lower triangular matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **diag** (*clblasDiag [in]*) – Specify whether matrix is unit triangular.
- **M** (*int [in]*) – Number of rows in matrix **B**.
- **N** (*int [in]*) – Number of columns in matrix **B**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.

- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYRK - Symmetric rank-k update of a matrix

pyclblas.**clblasCsyrk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasCsyrk

Rank-k update of a symmetric matrix with complex float elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha$ A A^T+ β C)
- ($C \leftarrow \alpha$ A^TA + β C)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **beta** (*complex [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDsyrk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasDsyrk

Rank-k update of a symmetric matrix with double elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha A A^T + \beta C$)
- ($C \leftarrow \alpha A^T A + \beta C$)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsyrk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasSsyrk

Rank-k update of a symmetric matrix with float elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha A A^T + \beta C$)
- ($C \leftarrow \alpha A^T A + \beta C$)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.

- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matric **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZsyrk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZsyrk

Rank-k update of a symmetric matrix with complex double elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha A A^T + \beta C$)
- ($C \leftarrow \alpha A^T A + \beta C$)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **beta** (*complex [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.

- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYR2K - Symmetric rank-2k update to a matrix

pyclblas.**clblasCsyr2k**(*order*, *uplo*, *transAB*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasCsyr2k

Rank-2k update of a symmetric matrix with complex float elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha$ A B^T+ α B A^T+ β C)
- ($C \leftarrow \alpha$ A^TB + α B^TA β C)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transAB** (*clblasTranspose [in]*) – How matrices **A** and **B** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrices **A** and **B** if they are not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrices **A** and **B**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.

- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDsyr2k**(*order*, *uplo*, *transAB*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasDsyr2k

Rank-2k update of a symmetric matrix with double elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha A B^T + \alpha B A^T + \beta C$)
- ($C \leftarrow \alpha A^T B + \alpha B^T A \beta C$)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transAB** (*clblasTranspose [in]*) – How matrices **A** and **B** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrices **A** and **B** if they are not transposed, and number of rows otherwise.
- **alpha** (*float [in]*) – The factor of matrices **A** and **B**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*float [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasSsyr2k`**(*order*, *uplo*, *transAB*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasSsyr2k

Rank-2k update of a symmetric matrix with float elements. Extended version. Rank-k updates:

- ($C \leftarrow \alpha$ A B^T+ α B A^T+ β C)
- ($C \leftarrow \alpha$ A^TB + α B^TA β C)

where **C** is a symmetric matrix.

Parameters

- **`order`** (*`clblasOrder [in]`*) – Row/column order.
- **`uplo`** (*`clblasUplo [in]`*) – The triangle in matrix **C** being referenced.
- **`transAB`** (*`clblasTranspose [in]`*) – How matrices **A** and **B** is to be transposed.
- **`N`** (*`int [in]`*) – Number of rows and columns in matrix **C**.
- **`K`** (*`int [in]`*) – Number of columns of the matrices **A** and **B** if they are not transposed, and number of rows otherwise.
- **`alpha`** (*`float [in]`*) – The factor of matrices **A** and **B**.
- **`A`** (*`pyopencl.Buffer [in]`*) – Buffer object storing matrix **A**.
- **`offA`** (*`int [in]`*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **`lda`** (*`int [in]`*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise.
- **`B`** (*`pyopencl.Buffer [in]`*) – Buffer object storing matrix **B**.
- **`offB`** (*`int [in]`*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **`ldb`** (*`int [in]`*) – Leading dimension of matrix **B**. It cannot be less less than **K** if **B** matches to the op(**B**) matrix in the row-major format, and less than **N** otherwise.
- **`beta`** (*`float [in]`*) – The factor of matrix **C**.
- **`C`** (*`pyopencl.Buffer [out]`*) – Buffer object storing matrix **C**.
- **`offC`** (*`int [in]`*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **`ldc`** (*`int [in]`*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **`commandQueues`** (*`pyopencl.CommandQueue [in]`*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **`eventWaitList`** (*`pyopencl.Event [in]`*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

`pyclblas.`**`clblasZsyr2k`**(*order*, *uplo*, *transAB*, *N*, *K*, *alpha*, *A*, *offA*, *lda*, *B*, *offB*, *ldb*, *beta*, *C*, *offC*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZsyr2k

Rank-2k update of a symmetric matrix with complex double elements. Extended version. Rank-k updates:

•($C \leftarrow \alpha$ A B^T+ α B A^T+ β C)

•($C \leftarrow \alpha$ A^TB + α B^TA β C)

where **C** is a symmetric matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transAB** (*clblasTranspose [in]*) – How matrices **A** and **B** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrices **A** and **B** if they are not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrices **A** and **B**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offA** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offB** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offC** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

SYMM - Symmetric matrix-matrix multiply

`pyclblas.`**`clblasCsymm`**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasCsymm

Matrix-matrix product of symmetric rectangular matrices with float-complex elements. Matrix-matrix products:

•($C \leftarrow \alpha$ A B + β C)

•($C \leftarrow \alpha$ B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.
- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumn-Major**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumn-MajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasDsymm**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasDsymm

Matrix-matrix product of symmetric rectangular matrices with double elements. Matrix-matrix products:

- (C ← α A B + β C)
- (C ← α B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.

- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **beta** (*float [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasSsymm**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasSsymm

Matrix-matrix product of symmetric rectangular matrices with float elements. Matrix-matrix products:

- (C $\leftarrow \alpha$ A B + β C)
- (C $\leftarrow \alpha$ B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.
- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.

- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **beta** (*float [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZsymm**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZsymm

Matrix-matrix product of symmetric rectangular matrices with double-complex elements. Matrix-matrix products:

- (C $\leftarrow \alpha$ A B + β C)
- (C $\leftarrow \alpha$ B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.
- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.

- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HEMM - Hermitian matrix-matrix multiplication

pyclblas.**clblasChemm**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasChemm

Matrix-matrix product of hermitian rectangular matrices with float-complex elements. Matrix-matrix products:

- (C $\leftarrow \alpha$ A B + β C)
- (C $\leftarrow \alpha$ B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.
- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.

- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZhemm**(*order*, *side*, *uplo*, *M*, *N*, *alpha*, *A*, *offa*, *lda*, *B*, *offb*, *ldb*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZhemm

Matrix-matrix product of hermitian rectangular matrices with double-complex elements. Matrix-matrix products:

- (C $\leftarrow \alpha$ A B + β C)
- (C $\leftarrow \alpha$ B A + β C)

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **side** (*clblasSide [in]*) – The side of triangular matrix.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix being referenced.
- **M** (*int [in]*) – Number of rows in matrices **B** and **C**.
- **N** (*int [in]*) – Number of columns in matrices **B** and **C**.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **A**.
- **offa** (*int [in]*) – Offset of the first element of the matrix **A** in the buffer object. Counted in elements.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **M** when the **side** parameter is set to **clblasLeft**, or less than **N** when the parameter is set to **clblasRight**.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing matrix **B**.
- **offb** (*int [in]*) – Offset of the first element of the matrix **B** in the buffer object. Counted in elements.

- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajor**.
- **beta** (*complex [in]*) – The factor of matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset of the first element of the matrix **C** in the buffer object. Counted in elements.
- **ldc** (*int [in]*) – Leading dimension of matrix **C**. It cannot be less than **N** when the **order** parameter is set to **clblasRowMajor**, or less than **M** when it is set to **clblasColumnMajorOrder**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HERK - Hermitian rank-k update to a matrix

pyclblas.**clblasCherk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasCherk

Rank-k update of a hermitian matrix with float-complex elements. Rank-k updates:

- (C $\leftarrow \alpha$ A A^H+ β C)
- (C $\leftarrow \alpha$ A^HA + β C)

where **C** is a hermitian matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset in number of elements for the first element in matrix **C**.

- **ldc** (*int [in]*) – Leading dimension of matric **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZherk**(*order*, *uplo*, *transA*, *N*, *K*, *alpha*, *A*, *offa*, *lda*, *beta*, *C*, *offc*, *ldc*, *commandQueues*, *eventWaitList*)

wraps: clblasZherk

Rank-k update of a hermitian matrix with double-complex elements. Rank-k updates:

- (C ← α A A^H+ β C)
- (C ← α A^HA + β C)

where **C** is a hermitian matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **transA** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*float [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset in number of elements for the first element in matrix **C**.
- **ldc** (*int [in]*) – Leading dimension of matric **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

HER2K - Hermitian rank-2k update to a matrix

pyclblas.**clblasCher2k**(*order, uplo, trans, N, K, alpha, A, offa, lda, B, offb, ldb, beta, C, offc, ldc, commandQueues, eventWaitList*)

wraps: clblasCher2k

Rank-2k update of a hermitian matrix with float-complex elements. Rank-k updates:

- (C $\leftarrow \alpha$ A B^H+ conj(α) B A^H+ β C)
- (C $\leftarrow \alpha$ A^HB + conj(α) B^HA + β C)

where **C** is a hermitian matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise. Vice-versa for transpose case.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **B**.
- **offb** (*int [in]*) – Offset in number of elements for the first element in matrix **B**.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **K** if **B** is in the row-major format, and less than **N** otherwise. Vice-versa for transpose case.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset in number of elements for the first element in matrix **C**.
- **ldc** (*int [in]*) – Leading dimension of matric **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

pyclblas.**clblasZher2k**(*order, uplo, trans, N, K, alpha, A, offa, lda, B, offb, ldb, beta, C, offc, ldc, commandQueues, eventWaitList*)

wraps: clblasZher2k

Rank-2k update of a hermitian matrix with double-complex elements. Rank-k updates:

- (C $\leftarrow \alpha$ A B^H+ conj(α) B A^H+ β C)

•($C \leftarrow \alpha A^H B + \mathrm{conj}(\alpha) B^H A + \beta C$)

where **C** is a hermitian matrix.

Parameters

- **order** (*clblasOrder [in]*) – Row/column order.
- **uplo** (*clblasUplo [in]*) – The triangle in matrix **C** being referenced.
- **trans** (*clblasTranspose [in]*) – How matrix **A** is to be transposed.
- **N** (*int [in]*) – Number of rows and columns in matrix **C**.
- **K** (*int [in]*) – Number of columns of the matrix **A** if it is not transposed, and number of rows otherwise.
- **alpha** (*complex [in]*) – The factor of matrix **A**.
- **A** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **A**.
- **offa** (*int [in]*) – Offset in number of elements for the first element in matrix **A**.
- **lda** (*int [in]*) – Leading dimension of matrix **A**. It cannot be less than **K** if **A** is in the row-major format, and less than **N** otherwise. Vice-versa for transpose case.
- **B** (*pyopencl.Buffer [in]*) – Buffer object storing the matrix **B**.
- **offb** (*int [in]*) – Offset in number of elements for the first element in matrix **B**.
- **ldb** (*int [in]*) – Leading dimension of matrix **B**. It cannot be less than **K** if B is in the row-major format, and less than **N** otherwise. Vice-versa for transpose case.
- **beta** (*float [in]*) – The factor of the matrix **C**.
- **C** (*pyopencl.Buffer [out]*) – Buffer object storing matrix **C**.
- **offc** (*int [in]*) – Offset in number of elements for the first element in matrix **C**.
- **ldc** (*int [in]*) – Leading dimension of matric **C**. It cannot be less than **N**.
- **commandQueues** (*pyopencl.CommandQueue [in]*) – OpenCL command queues. A list, tuple, or single instance of pyopencl.CommandQueue. Must not be None.
- **eventWaitList** (*pyopencl.Event [in]*) – Event wait list. A list, tuple, or single instance of pyopencl.Event. May be None.

Returns A tuple of pyopencl.Event instances, one for each commandQueue supplied.

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