OpenCL Events

An event is an object that communicates the status of OpenCL commands.

- Read Buffer dC
- Execute Kernel
- Write Buffer dB
- Write Buffer dA

Event

Whopp-a, whopp-a
size_t globalWorkSize[3] = { NUM_ELEMENT, 1, 1 };  
size_t localWorkSize[3] = { LOCAL_SIZE, 1, 1 };  

status = clEnqueueNDRangeKernel( cmdQueue, kernel, 1, NULL, globalWorkSize, localWorkSize, 0, NULL, NULL );

status = clEnqueueNDRangeKernel( cmdQueue, kernel, 1, NULL, globalWorkSize, localWorkSize, 0, NULL, &waitKernelC );
Waiting for Events from Previously-Executed Kernels

```c
cl_event waitKernelA, waitKernelB, waitKernelC;

... cl_event dependenciesAB[ 2 ];
dependenciesAB[ 0 ] = waitKernelA;
dependenciesAB[ 1 ] = waitKernelB;
status = clEnqueueNDRangeKernel( cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize,
2, dependenciesAB, NULL );
```

Creating an Execution Graph Structure

```c
cl_event waitKernelA, waitKernelB, waitKernelC;
cl_event dependenciesAB[ 2 ];
dependenciesAB[ 0 ] = waitKernelA;
dependenciesAB[ 1 ] = waitKernelB;
status = clEnqueueNDRangeKernel( cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize,
2, dependenciesAB, &waitKernelC );
```
Creating the Full Execution Graph Structure

cl_event waitKernelA, waitKernelB, waitKernelC, waitKernelD;

cl_event dependenciesAB[2];
dependenciesAB[0] = waitKernelA;
dependenciesAB[1] = waitKernelB;

cl_event dependenciesCD[2];
dependenciesCD[0] = waitKernelC;
dependenciesCD[1] = waitKernelD;

status = clEnqueueNDRangeKernel(cmdQueue, kernelA, 1, NULL, globalWorkSize, localWorkSize, 0, NULL, \&waitKernelA);
status = clEnqueueNDRangeKernel(cmdQueue, kernelB, 1, NULL, globalWorkSize, localWorkSize, 0, NULL, \&waitKernelB);
status = clEnqueueNDRangeKernel(cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize, 2, dependenciesAB, \&waitKernelC);
status = clEnqueueNDRangeKernel(cmdQueue, kernelD, 1, NULL, globalWorkSize, localWorkSize, 0, NULL, \&waitKernelD);
status = clEnqueueNDRangeKernel(cmdQueue, kernelE, 1, NULL, globalWorkSize, localWorkSize, 2, dependenciesCD, NULL);

Waiting for One Event

cl_event waitKernelA, waitKernelB.

... 

status = clEnqueueNDRangeKernel(cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize, 1, \&waitKernelA, NULL);
Placing a Barrier in the Command Queue

status = clEnqueueBarrier( cmdQueue );

Note: this cannot throw its own event

This does not complete until all commands enqueued before it have completed.

Placing an Event Marker in the Command Queue

ci_event waitMarker;
status = clEnqueueMarker( cmdQueue, &waitMarker );

Note: this can throw its own event

This does not complete until all commands enqueued before it have completed.

This is just like a barrier, but it can throw an event to be waited for.
Waiting for Events Without Enqueuing Another Command

status = clWaitForEvents( 2, dependencies );

This **blocks** until the specified events are thrown, so use it carefully!

I Like Synchronizing Things This Way

```c
// wait until all queued tasks have taken place:

void Wait( cl_command_queue queue )
{
    cl_event wait;
    cl_int status;

    status = clEnqueueMarker( queue, &wait );
    if( status != CL_SUCCESS )
        fprintf( stderr, "Wait: clEnqueueMarker failed\n" );

    status = clWaitForEvents( 1, &wait );    // **blocks** until everything is done!
    if( status != CL_SUCCESS )
        fprintf( stderr, "Wait: clWaitForEvents failed\n" );
}
```

Call this before starting the timer, before ending the timer, and before retrieving data from an array computed in an OpenCL program.
Getting Event Statuses Without Blocking

CL_EVENT_COMMAND_QUEUE
CL_EVENT_CONTEXT
CL_EVENT_COMMAND_TYPE
CL_EVENT_COMMAND_EXECUTION_STATUS

Specify one of these:
- CL_QUEUE
- CL_SUBMITTED
- CL_RUNNING
- CL_COMPLETE

```
cl_int eventStatus;
status = clGetEventInfo(waitKernelC, CL_EVENT_COMMAND_EXECUTION_STATUS, sizeof(cl_int), &eventStatus, NULL);
```

Note that this is a nice way to check on event statuses without blocking. Thus, you could put this in a loop and go get some other work done in between calls.