OpenCL Events

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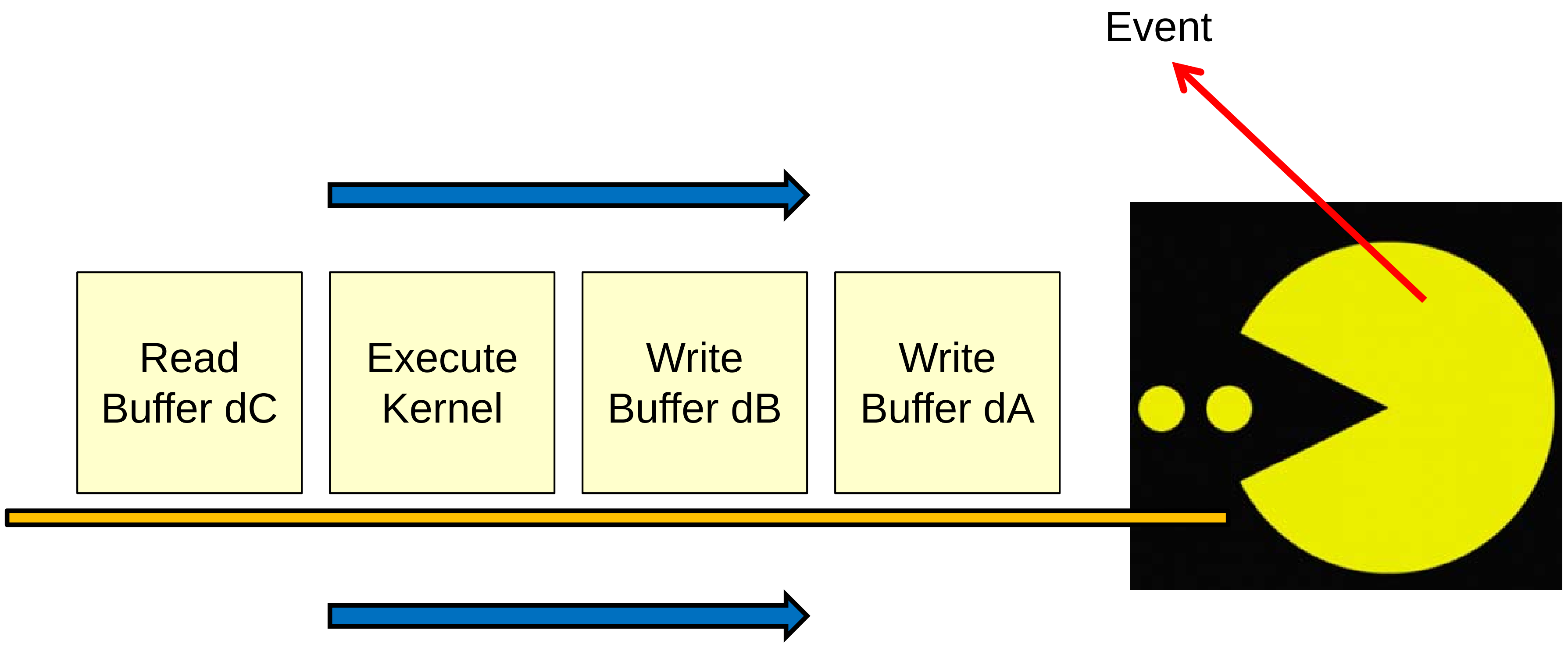
OpenCL Events

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



From the OpenCL Notes:

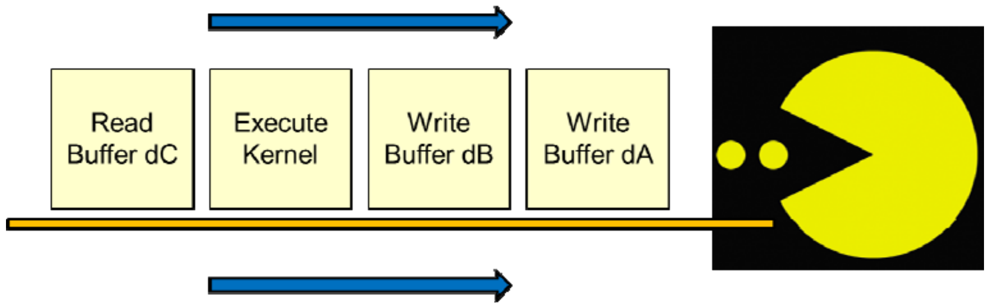
11. Enqueue the Kernel Object for Execution

```
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 );
```

# events   event object

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

event wait
list

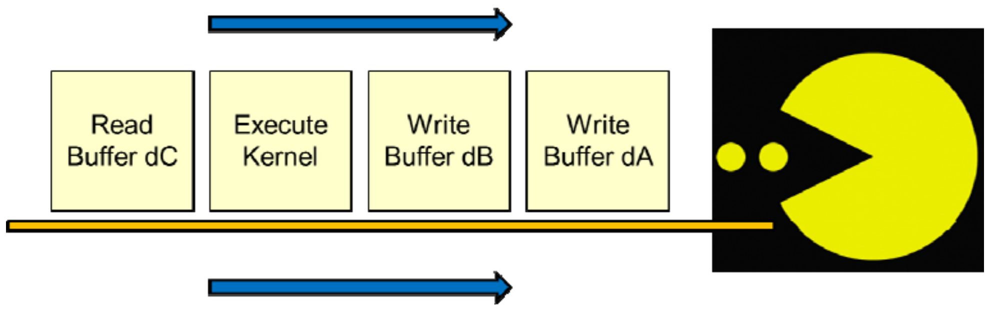


Creating an Event

event being created

```
cl_event   waitKernelC;

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

event(s) to wait for



Waiting for Events

```
cl_event  waitKernelA,  waitKernel B.

                . . .

cl_event  dependencies[ 2 ];

dependencies[ 0 ] = waitKernelA;
dependencies[ 1 ] = waitKernelB;

status = clEnqueueNDRangeKernel( cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize, 2, dependencies, NULL );
```

event being created

event(s) to wait for

Waiting for One Event

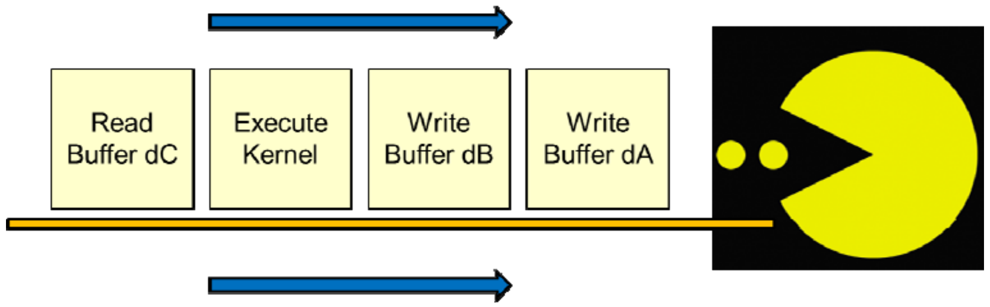
```
cl_event  waitKernelA,  waitKernel B.

                    . . .


status = clEnqueueNDRangeKernel( cmdQueue, kernelC, 1, NULL, globalWorkSize, localWorkSize, 1, &waitKernelA, NULL );
```

$\underbrace{\textbf{1, \&waitKernelA}}_{\text{event(s) to wait for}}$

Placing a Barrier in the Command Queue

```
status = clEnqueueBarrier( cmdQueue );
```

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



Placing an Event Marker in the Command Queue

```
cl_event waitMarker;

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

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

$$\texttt{status = clWaitForEvents(}\ \underbrace{\texttt{2, dependencies}}_{\text{event(s) to wait for}}\ \texttt{);}$$

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

I Like Doing This

```
// 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 using data from an array returned from OpenCL.

Getting Various Configuration IDs: Remember This?

```
cl_uint  numPlatforms;
status = clGetPlatformIDs( 0, NULL, &numPlatforms );

fprintf( stderr, "Number of Platforms = %d\n", numPlatforms );

cl_platform_id   * platforms = new  cl_platform_id[ numPlatforms  ];

status = clGetPlatformIDs( numPlatforms, platforms, NULL );
```

This way of querying information is a recurring OpenCL pattern

```
                          How many        Where to      How many total
                           to get         put them        there are
status = clGetPlatformIDs(    0,             NULL,      &numPlatforms );

status = clGetPlatformIDs( numPlatforms, platforms,         NULL       );
```

Getting Event Statuses Works the Same Way

CL_EVENT_COMMAND_QUEUE
CL_EVENT_CONTEXT
CL_EVENT_COMMAND_TYPE
CL_EVENT_COMMAND_EXECUTION_STATUS

Specify one of these

```
cl_int  eventStatus;

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

CL_EVENT_COMMAND_EXECUTION_STATUS returns one of these

CL_QUEUED
CL_SUBMITTED
CL_RUNNING
CL_COMPLETE

cl_int is what type CL_EVENT_COMMAND_EXECUTION_STATUS returns

Note that this 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.