

CSCI 4060U: OpenCL Programming Basics II

How can OpenCL be beneficial? What's the BIG win in using OpenCL

Consider traditional loops:

```
void multiply(const int n, const float *a, const float *b, float *c) {
    int i;
    for (i=0; i < n; i++) {
        c[i] = a[i] * b[i];
    }
}
```

OpenCL provides performance benefits by replacing loops with functions (kernels) – SIMD

```
__kernel void multiply(__global const float *a, __global const float *b,
                      __global float *c) {
    int id = get_global_id(0);
    c[id] = a[id] * b[id];
}
```

The ***hard part*** of OpenCL is often the Host program that sets up the environment as well as creates and manages the kernels.

Basic structure of a host program:

1. Define the platform (**devices, context, queues**)
2. Create and build the **program** (dynamic library for kernels)
3. Setup **memory** objects
4. **Define** the kernel (i.e., attach arguments to the kernel function)
5. Submit **commands** (transfer memory objects (i.e. data) and execute kernels)