OpenCL

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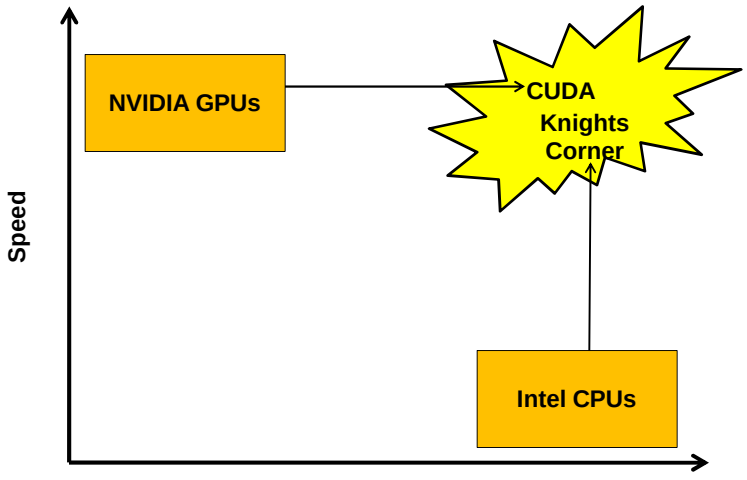
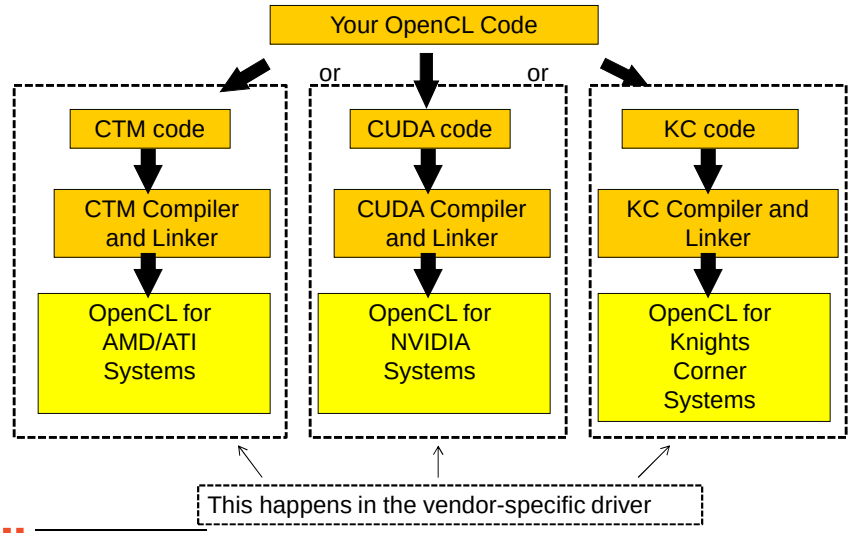
Reaching the Promised Land



But, the problem is that you have to use a vendor-specific API

OpenCL – Vendor-independent GPU Programming



OpenCL

- A C-like language, originally proposed by Apple, now an industry standard
- Like CUDA, OpenCL can share data with OpenGL
- You write one program, but designate a C/C++ part of it to run on the CPU and an OpenCL part to run on the GPU
- You can't ask for threads in the OpenCL part, but the translation process might create them for you. (Also, you can use them in the CPU part via OpenMP, pthreads, etc.)

OpenCL wants you to break the problem down

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

```
kernel void
mul( global float *a, global float *b, global float *c)
{
        int id = get_global_id (0 );
        c[id] = a[id] * b[id];
}
```


OpenCL also supports vector parallelism

Part of OpenCL is vector-oriented, meaning that it can perform a single instruction on multiple data values at the same time (SIMD). Vector data types are: char*n*, int*n*, float*n*, where *n* = 2, 4, 8, or 16.

```
float4  f, g;
f = (float4)( 1.f, 2.f, 3.f, 4.f );

float16  a16, x16, y16, z16;

f.x = 0.;
f.xy = g.zw;
x16.s89ab = f;

float16  a16  =  x16 * y16  +  z16;
```