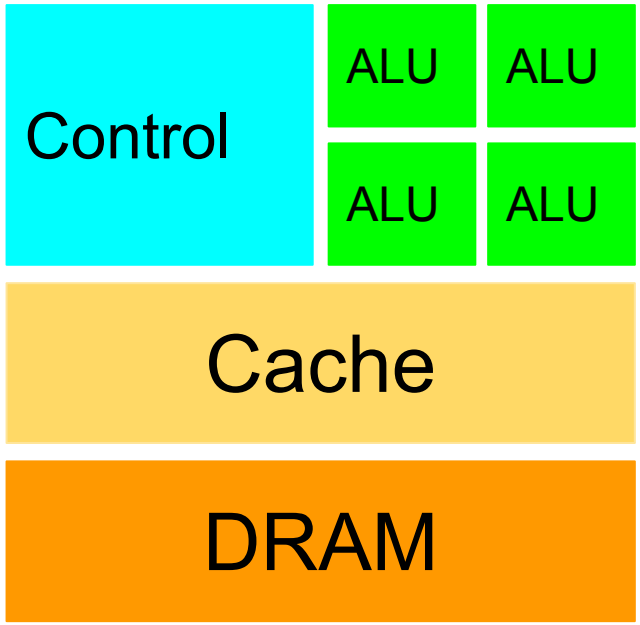
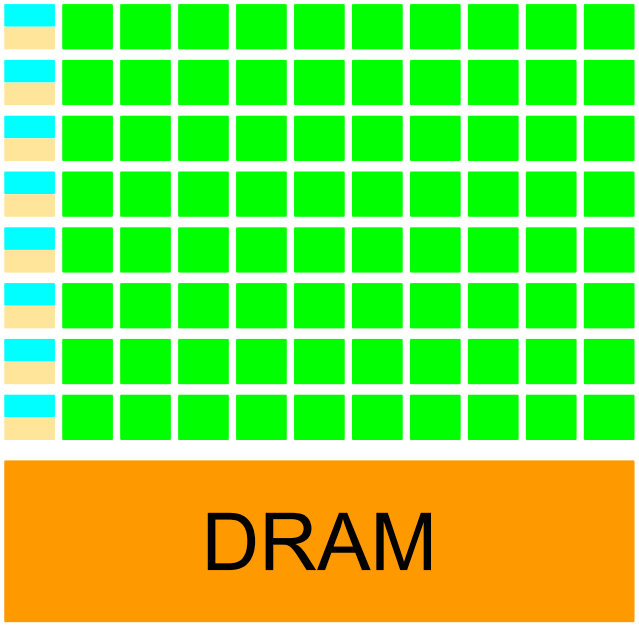
GPU vs. CPU



CPU



GPU

What will be done on the CPU

```
vector<thread> sync;
sync.reserve(thread::hardware_concurrency());
const unsigned int chunk = ceil(zvalues.size() / thread::hardware_concurrency());
for (size_t i = 0; i < thread::hardware_concurrency(); i++)
{
    sync.emplace_back([=, &zvalues]() {

        auto beg = begin(zvalues) + (i*chunk);
        auto ed = end(zvalues);
        if (((i + 1)*chunk) < zvalues.size())
            ed = beg + chunk;
        for_each(beg, ed, [&](double & value) {
            value = floor((value - min) / stepsize);
        });
    });

}
for (auto &t : sync) { ... }
```

What will be done on the GPU

```
void AcceleratedAlgo::LongLatToMap16(vector<double>& zvalues, const double & min, const double & max,
    int width, int height, unsigned int bits )
{
    const double stepsize = (max - min) / (std::pow(2, bits) - 1);

    concurrency::extent<2> image_extent(width, height);
    pick_accelerator();

    array_view<double, 2> texture_src(image_extent, zvalues);

    parallel_for_each(image_extent, [=](index<2> idx) restrict(amp) {

        texture_src[idx] = precise_math::floor((texture_src[idx] - min) / stepsize);

    });
    texture_src.synchronize();
}
```

File Size (Data Size)	Desktop		Laptop		Laptop (Battery)	
	GPU (GTX970)	CPU (i7 4790k)	GPU (GTX1050)	CPU (i7 7700HQ)	GPU (GTX1050)	CPU (i7 7700HQ)
2MB (342 KB)	81 ms	1 ms	942 ms	1 ms	1133 ms	1 ms
2 GB (343 MB Data)	311 ms	43 ms	1130 ms	29 ms	1379 ms	29 ms
6 GB (1 GB data)	618 ms	127 ms	1448 ms	85 ms	1772 ms	85 ms
12 GB (2GB)	1206 ms	243 ms	1900 ms	164 ms	2722 ms	168 ms

What I’ve learn

- Always benchmark
- GPU is not a magic solution when you have a lot of data
- A good use case for the GPU is a lot of data + complex operations
- Laptop and desktop grade components have different behaviours
- on Laptop it’s not always clear which GPU is used, Intel integrated or GTX1050 (driver pick one depending on the task and conditions)
- For optimal performance a calibration test should be made for the software
- Do other GPU tech have the same results?