



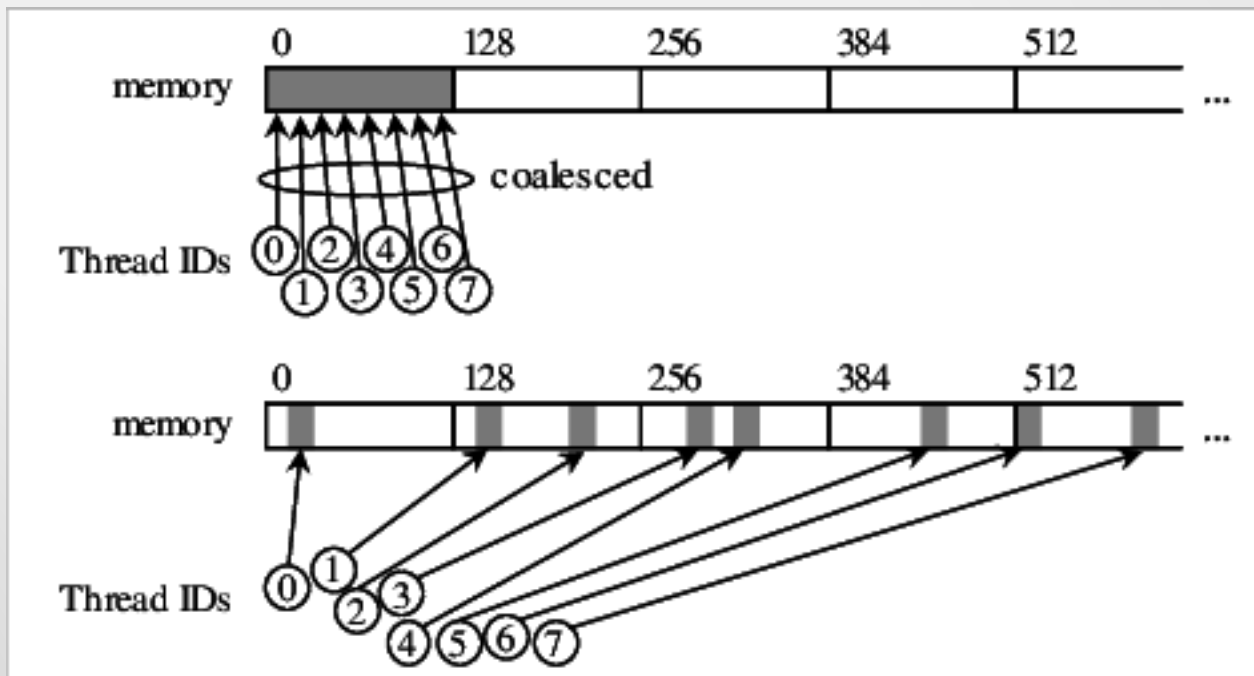
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# C EURO<sup>2</sup>

Performance Engineering on CPUs and GPUs:  
- GPUs: Things to be Careful for Performance -  
Kamer Kaya, Sabancı University

# Things to be Careful for Performance:

## (1) Coalesced memory accesses



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```
__global__ void foo(int* input, float3* input2) {  
    int i = blockDim.x * blockIdx.x + threadIdx.x;  
  
    // Stride 1, OK!  
    int a = input[i];  
  
    // Stride 2, half the bandwidth is wasted  
    int b = input[2*i];  
  
    // Stride 3, assuming (x,y,z)  
    // 2/3 of the bandwidth wasted  
    float c = input2[i].x;  
}
```

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## (1) Coalesced memory accesses

```
__global__ void bar(record* AoS_data, SoA SoA_data) {  
    int i = blockDim.x * blockIdx.x + threadIdx.x;  
  
    // AoS wastes bandwidth  
    int key1 = AoS_data[i].key;  
  
    // SoA efficient use of bandwidth  
    int key2 = SoA_data.keys[i];  
}
```

```
Struct SoA {  
    int* keys;  
    int* values;  
    int* flags;  
};
```

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**Let's check some examples.**

# Thanks



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