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Parallel reduction

In this exercice a parallel reduction kernel will be implemented. Write a kernel performing the sum operation.

Starting point:

In [ ]:
```
%% file parallel_reduction.cu

#include <stdio.h>

void cpu_sum(int *x, int n)
{
    int result = 0;
    for(unsigned int i=0; i < n; ++i) {
        result += x[i];
    }
    printf("CPU Sum is %d \n", result);
}

__global__ void gpu_sum(int *x)
{
    int tid = blockIdx.x * blockDim.x + threadIdx.x;

    // write your code here
    // tip: use `__syncthreads()` to synchronize the threads
}

int main()
{
    int h[] = {10, 1, 8, -1, 0, -2, 3, 5, -2, -3, 2, 7, 0, 11, 0, 2};

    int size = sizeof(h);
    int count = size/sizeof(int);

    int* d;
    cudaMalloc(&d, size);
    cudaMemcpy(d, h, size, cudaMemcpyHostToDevice);

    gpu_sum <<<1, count >>>(d);

    int result;
    cudaMemcpy(&result, d, sizeof(int), cudaMemcpyDeviceToHost);
    printf("GPU Sum is %d \n", result);

    //cpu_sum(h, count);
    cudaFree(d);
    return 0;
}
```

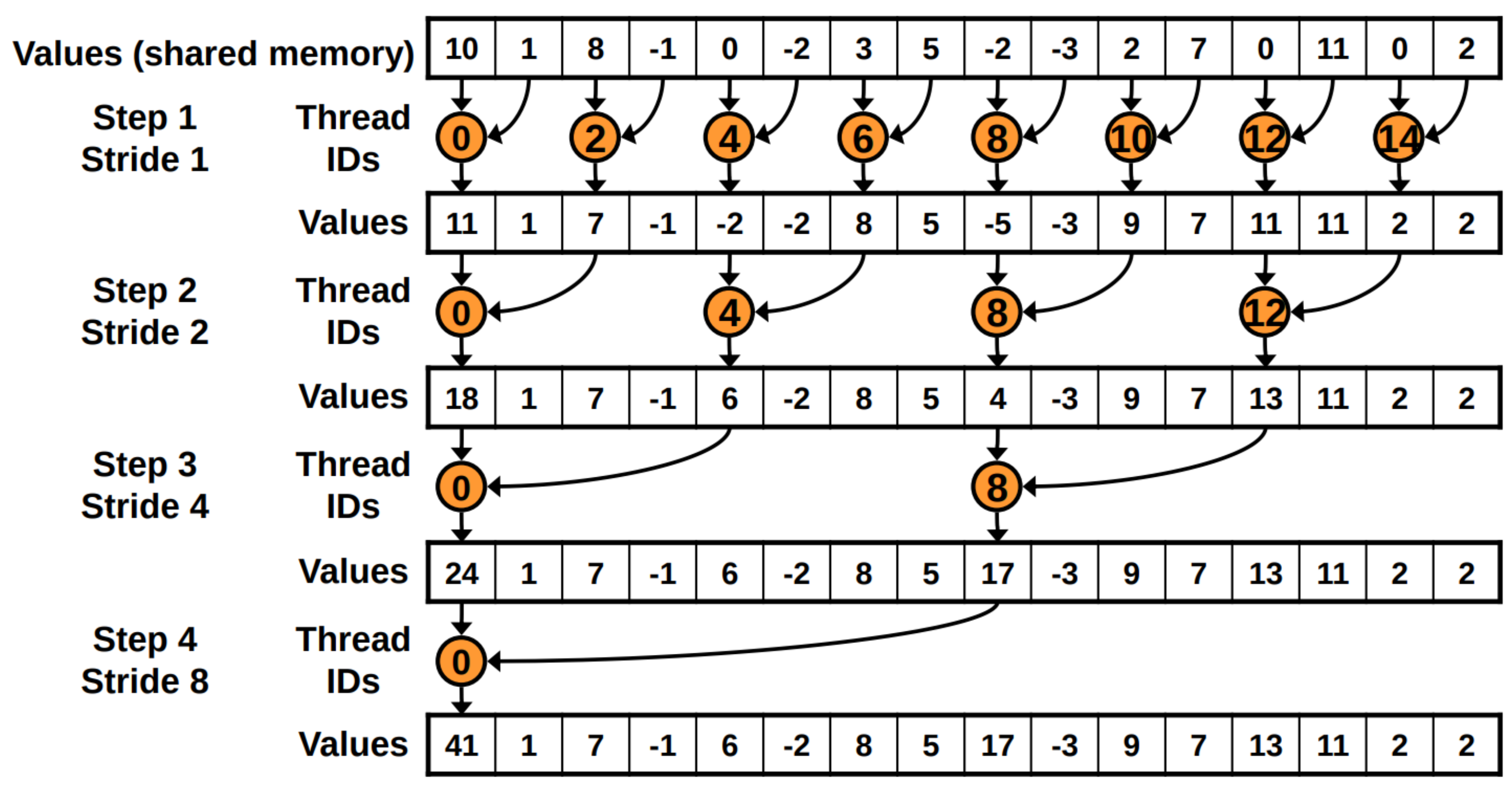
In [ ]:
```
!nvidia-smi
```

In [ ]:
```
%%bash

CUDA_SUFF=35
nvcc -gencode arch=compute_${CUDA_SUFF},code=sm_${CUDA_SUFF} ./parallel_reduction.cu -o parallel_re
./parallel_reduction
```

The algorithm can be implemented in two ways:

Naive memory access (interleaved addresing):



Optimised memory access (sequantial addresing):