

### GPU COMPUTING EXERCISES AND SETUP

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### **SETUP** Everything is in ~lap24mw/gpu/

Copy exercises material from

rsync -rvP ~lap24mw/gpu/exercises ~/

Prepare environment

source env.sh

Run GPU jobs prefixed with srun
srun -N1 -p a100 --gpus=1 --reservation=short <cmd>



Tomorrow: We use Nsight Systems and Nsight Compute

either use x-forwarding

ssh -X ...

srun --x11 ...

view locally (install GUI on your PC/laptop, no GPU needed)

https://developer.nvidia.com/nsight-systems

https://developer.nvidia.com/nsight-compute

## **EXERCISES 1**



Look for TODOs in the Makefile and the source code

Makefile Targets:

saxpy\_blas

run

clean

profile



Look for TODOs in the source code

Makefile Targets:

saxpy

run

clean

profile

nsys



Look for TODOs in the source code first, then in the Makefile

This task needs it own environment envstdpar.sh

Makefile Targets:

Saxpy\_stdpar

run

clean

profile

nsys

# EXERCISES 2

#### **EXAMPLE: JACOBI SOLVER**

While not converged

Do Jacobi step:



#### **EXAMPLE: JACOBI SOLVER**

Tasks:

Replace the memory allocation with managed memory

Parallelize the iy - loop using CUDA

Use 1 thread and 1 block

Use 256 threads and 1 block

Use 1 thread / block and 84 blocks

(see also <a href="https://developer.nvidia.com/blog/cuda-pro-tip-write-flexible-kernels-grid-stride-loops/">https://developer.nvidia.com/blog/cuda-pro-tip-write-flexible-kernels-grid-stride-loops/</a>)

Parallelize both the iy and ix loop

Tomorrow: Take a look at your results with Nsight systems Tomorrow: Take a look at your results with Nsight compute



