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Performance exercise

Try this at home!

Prerequisites

- Linux (virtual or physical) machine with GPU (CUDA compute capability >=5.2)
- Docker (https://www.docker.com/)
- (All the software and the dependencies, for example ECMWF's Atlas https://github.com/ecmwf/atlas are already contained in a docker image)

Pulling the image

With docker:

```
$ sudo docker pull dawnico/performance_exercise
```

If you are curious about how the software has been built in the image, here is the Dockerfile:
https://github.com/dawn-ico/performance_exercise/blob/homework/Dockerfile

Using the image

The exercise can be performed from within the container:

```
$ sudo docker run -it dawnico/performance_exercise
```

The working directory is set to `/root/performance_exercise`.

Here you will find `exercise.py` (dusk script), `exercise_cuda.cu` (readable generated code to be optimized), `exercise_driver.cpp` (calling the stencil).

You can use `vim` to edit files.

Using the image (alternative)

If you don't want to edit files from the command line, you could sync a local folder with the container's exercise folder:

```
$ git clone -b homework
https://github.com/dawn-ico/performance_exercise.git
$ sudo docker run -it -v
./performance_exercise:/root/performance_exercise
dawnico/performance_exercise
```

Then you can edit files outside of the container (`./performance_exercise` folder) and changes will be reflected inside.

Setup environment

From within the container, you should first load the prepared environment before you can compile/run:

```
$ source load-env.sh
```

Each time you want to work on the exercise you have to load this environment in the container's shell.

CLI test

You should now try if you have a working installation of dusk and dawn

```
$ dusk-front --help
$ dawn-opt --help
$ dawn-codegen --help
```

Exercise

To compile

```
$ ./compile.sh
```

To run

```
$ ./exercise
```

(as shown during the demo)

Exercise

To obtain the baseline (code generation):

```
$ dusk-front exercise.py | dawn-opt | dawn-codegen -b
cuda-ico -o exercise_cuda.cu
```

… you can try optimizations on `exercise_cuda.cu` by hand or you can get an optimized one from dawn:

```
$ dusk-front exercise.py | dawn-opt --default-opt |
dawn-codegen -b cuda-ico -o exercise_cuda.cu
```

Have fun :)

Q&A

Questions?

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