An introduction to Nsight Systems

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1   Overview and client installation

NVIDIA's Nsight Systems profiling tools are usually used in two stages.

First, the user uses a command such as

`nsys profile application_code`

to run their code and produce an output file with a name of the form `filename.nsys-rep`.

Then, the user runs an interactive graphics program to display the results of the profiling, using a command such as

`nsys-ui filename.nsys-rep`

The first command has to be used on a GPU node which is capable of executing your CUDA code. In this case, both `nsys` and `nsys-ui` are very likely to have been installed already.

However, the benefit of the two-stage process is that you can copy the report back to your desktop or laptop system to run `nsys-ui` locally to work with it interactively. In this case you may need to install `nsys-ui` on your local system even though you don't have an NVIDIA GPU.

The software and installation details are available from NVIDIA here.

On my Ubuntu system at home, for which I have sudo rights, I downloaded the appropriate `*.deb` file, and installed it using the command:

`sudo apt install nsight-systems-2023.4.1_2023.4.1.97-1_amd64.deb`

NOTE: this was correct on 6/12/2023 but may change to a newer version in the future.
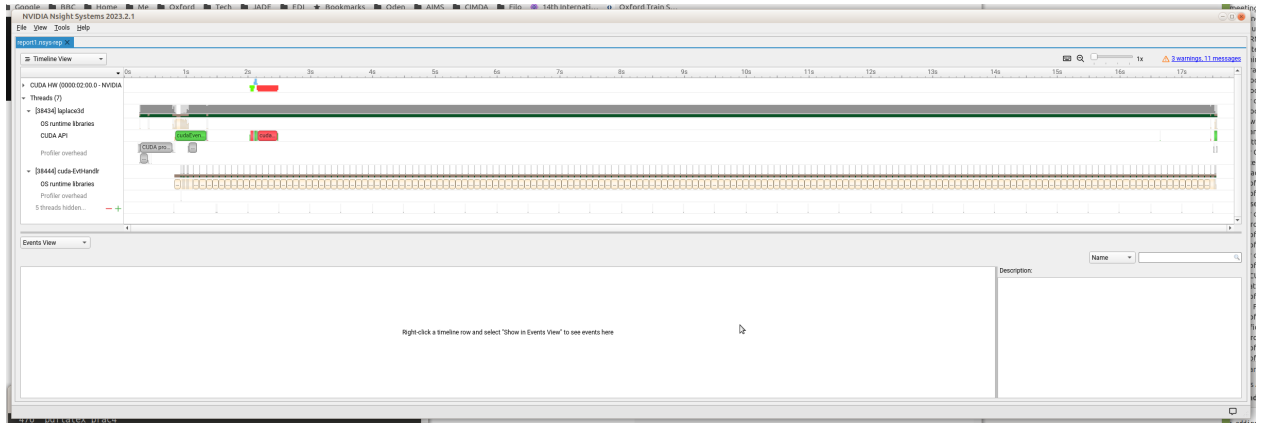
For desktops within the university it might be better to ask your IT support team to install it for general use, or you could perhaps install it in your own user space just for your use.
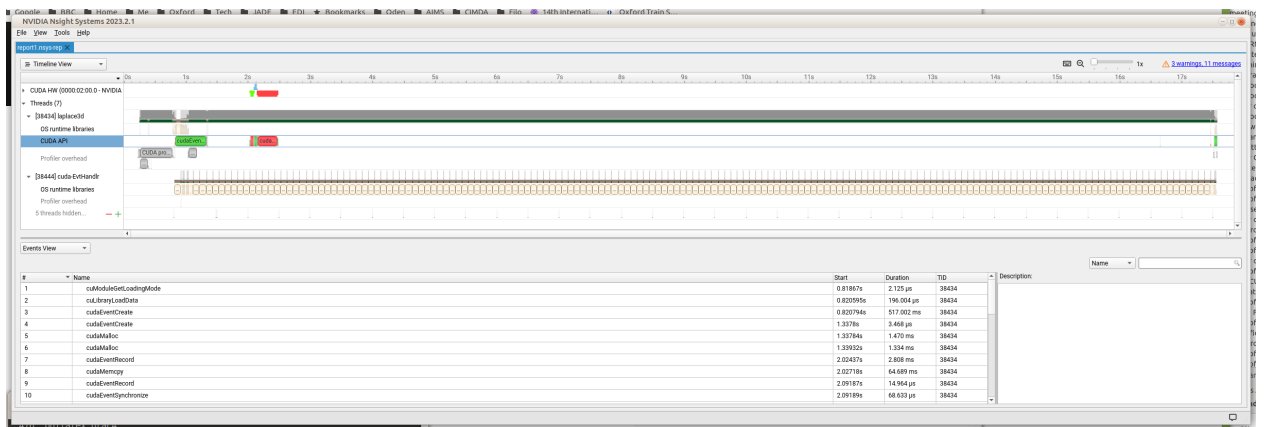
2   Using the interactive viewer

Starting the viewer with a command of the form

`nsys-ui filename.nsys-rep`

produces a display which looks like

Clicking on CUDA API, and then right-clicking on "Show in Events View" leads to the bottom Events View pane showing a list of the kernels and CUDA operations carried out on the GPU (including how long they each took):

Clicking on one of those, and then zooming in by ctrl+mouse wheel (which zooms in time relative to the current mouse location, a bit like Google Map zooms) gives the following:
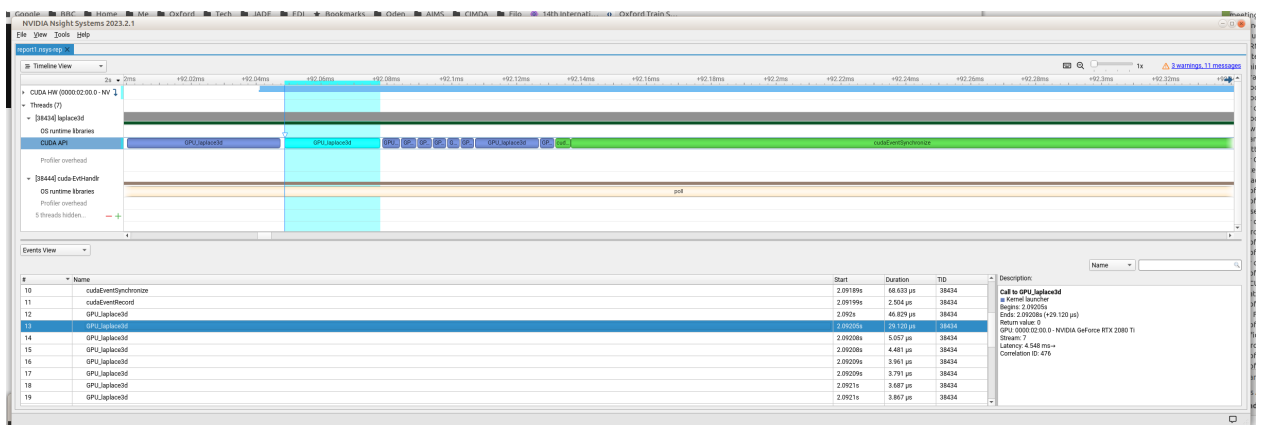
Clicking on the keyboard symbol in the top-right gives other ways of navigating the primary Timeline View pane. There is also a slider bar which controls the vertical spacing.

For more examples of the use of `nsys` and `nsys-ui` see these slides from ISC 2023.