swift hep wp4 meeting, notes

Present:
Alison Elliot, Ben Wynne, Claire Shepherd, Davide Costanzo, Jyoti Biswal, Sam Harper, Stewart Martin-Haugh

Round table:

Alison - I’m playing around with an alveo u250 FPGA card installed at RAL. Following the footsteps of what has been done at sussex with a CMS algorithm instead of with the ATLAS algorithm. hough transform plus a kalman filter.

—Training interlude—

Stewart, Claire - training course to be held at RAL next year. This is likely to be VHDL, hls in mind in the future. However, physical space limitation for hands-on things.

Davide - Planning a C++ training course in person, using SWIFT-HEP training funds. need to find an organiser for that, but have some ideas.

Should have some GPU stuff clearly. Excalibur Hartree/Sheffield had a training last year.

Stewart - Antonin Portelli did a nice course, Exaliber/lattice thing, assembly language, and linux binary stuff, if he’s planning to repeat, should get more hep people to sign up?
https://github.com/aportelli/exalat-binary-lectures/

—End training interlude—

Round table continues

Ben - working on EF tracking upgrade for ATLAS - does this fall in the remit of this meeting? Ans: has to end up with something useful for other experiments as well. We like to hear what experiments are doing to see how it could be joined together. Just to get ATLAS and CMS people in the same room and have a chat about things is good.

Ben - main activity in trigger is with EF tracking upgrade, running tracking in the HLT using GPUs. looking for others in the UK HEP community is working on GPU programming. Trying to put together useful training material to get people working on GPUS, in ATLAS athena, and then also the traccc project, ACTX. MPhys student working on clusterisation of silicon module hits in traccc in GPU.

Q: who is doing the FPGA side of this?
A: Coming from FTK and HTT - so mostly US institutes doing work, but on off the shelf FPGA boards, instead of custom hardware. Does include UK people - such as Alex Cerri. Veronique Boisvert is leader. GPU stuff mostly UK

Comment: Sam - from CMS point of view, from the UK, Thomas Reis is doing stuff for GPUs for trigger, he’s porting to alpaka, and a lot of tracking, is pattatrack is mostly cern people (pixel people). tracking in alpaka? ECAL part is what is Thomas is doing. FPGAs for strips phase 2, and pixels are GPUs.

Claire - fill in on Alison's project of the stuff: Goal is generic FPGA acceleration but using CMS tracking as a test bed convenient as it overlaps with what people are doing. eg, HT at Sussex. ideally write something in any language you’d like, and it would work anywhere you'd like.

Davide - Putting together plan of work for March 2024. Have funded extension until March 2025. Around next summer start writing proposal for Apr 25- Mar 28. R&D will finish, go into deployment, need to start thinking what we want to do for generic R&D. Discuss next spring, if people have an idea, good time to start putting it out. Generic computing type things. At the next or next to next workshop, invite someone from FCC. Need to enter that business.

Comment: Claire - going to send around doodle poll for Advisory Board meeting.

Jyoti - CPU vs GPU throughput with trigfast .... discussion about 2 months ago, what should be doing, what APIs. to be using, so that’s all.

Stewart - Track seeding written in cuda, run in multithreaded ATLAS software, see how much throughput offloading to CPU. Doing ACTS and traccc in the future.

Comment: Ben - MT scheduler in Gaudi is a pet project, interested in event batching, data from more than one event, single structure, sent to GPU, and single kernel, see what results are.

Stewart - MT throughput data, for track seeding, is there anything we can do with event batching? chicken egg - no one is sure if it's worth putting event batching into Gaudi, so no one can test to see if its worth doing....

other thing - we have other GPU tracking kernels for EF tracking project that would like to get integrated. need to discuss more, as results look really weird, so need to discuss in another forum.

Sam - not too much on this, focussing on other tasks, basically paying attention to porting to alpaka from cuda, encourage them to share their feedback on that to this group or something like that. they have just started though..
Stewart - my summary is largely working with Jyoti on atlas throughput stuff, ill-advised digression into alpaka how it works, build system problem, learned a lot of cmake. backends are interesting, if we used on atlas, we’d have to do something weird with cmake, not sure how it would work in practise.

Ben - already do weird backend support with cmake for other stuff already in athena.

followed alpaka tutorials on youtube, useful though trunk dev moved on from when this was made
https://www.youtube.com/playlist?list=PLVyQXsMxRYdEoahVQAqf9_rewGj3VkB4

https://github.com/alpaka-group/alpaka/pull/1843

Comment: Davide - Mark Hodgkinson did tests for alpaka, a few attempts at it.

kokkos - Charles Leggett about that. CMS have done something practically that works with this. further than we are with kokkas. in alpaka can get performance almost towards what native cuda can do. alpaka can outperform CPU multithreaded code.
https://indico.cern.ch/event/912156/

HPX comments:
https://hpx.stellar-group.org/
https://indico.cern.ch/event/1168515/contributions/4913134/attachments/2463081/4223168/HPX_sched_update.pdf

AOB:

Davide: web presence - can a new person take on filling out some of the pages? Hugo, markdown, thing in github. Lucas set it up.

Regarding the documentation, the github link:
https://github.com/SWIFT-HEP/swift-hep.github.io

If you write something under WP4, then submit a merge request. The file in question is
https://github.com/SWIFT-HEP/swift-hep.github.io/tree/main/content/workpackages/04_reconstruction_and_trigger

Next meeting: January 18th tentatively