

Day 1: Monday 28/10 (times in CET)

Start	Duration	Item	Names
09:00	15	Welcome, introduction to the course <i>Course organisation.</i> <i>Demonstration of how to use HedgeDoc.</i>	Emmanuel / Jørn / Harvey
09:15	60	Introduction to the HPE Cray Hardware <i>Focus on the HPE Cray EX hardware architecture.</i>	Harvey
10:15	30	Introduction to the HPE Cray Programming Environment <i>Focus on the HPE Cray EX software stack.</i> <i>Tutorial on the Cray module environment and compiler wrapper scripts.</i>	Harvey
10:45	15	Break	
11:00	20	First steps for running on Cray EX Hardware <i>Examples of using the Slurm Batch system, launching jobs on the front end and basic controls for job placement.</i>	Harvey
11:20	40	Exercises (session #1)	
12:00	90	Lunch break	
13:30	60	Overview of compilers and Parallel Programming Models <i>An introduction to the compiler suites available, including examples of how to get additional information about the compilation process. Special attention is given the Cray Compilation Environment (CCE) noting options relevant to porting and performance.</i> <i>Description of the Parallel Programming models.</i>	Harvey
14:30	30	Exercises (session #2)	
15:00	15	Break	
15:15	30	Scientific Libraries <i>Presentation of the Cray Scientific Libraries for CPU and GPU execution.</i>	Harvey
15:45	30	Exercises (session #3)	
16:15	45	OpenACC and OpenMP offload with Cray Compilation Environment <i>Directive-based approach for GPU offloading execution with the Cray Compilation Environment.</i>	Harvey
17:00	30	Open Questions & Answers Participants are encouraged to continue with exercises in case there should be no questions.	
17:30		End of the course day	

Day 2: Tuesday 29/10 (times in CET)

Start	Duration	Item	Names
09:00	60	Advanced Application Placement <i>More detailed treatment of Slurm binding technology and OpenMP controls.</i>	Jean
10:00	30	Exercises (session #4)	
10:30	15	Break	
10:45	45	Debugging at Scale <i>gd4hpc, valgrind4hpc, sanitizer4hpc, ATP, STAT.</i>	Thierry
11:30	30	Exercises (session #5)	
12:00	80	Lunch break	
13:20	60	Introduction to AMD ROCm ecosystem and HIP	Samuel
14:20	30	Exercises (session #6)	
14:50	20	Break	
15:10	110	Additional software on LUMI <i>Software policy. Software environment on LUMI. Installing software with EasyBuild (concepts, contributed recipes). Containers for Python, R, VNC (container wrappers).</i>	Kurt
17:00	30	Open Questions & Answers Participants are encouraged to continue with exercises in case there should be no questions.	
17:30		End of the course day	

Day 3: Wednesday 30/10 (times in CET)

Start	Duration	Item	Names
09:00	40	Introduction to Perftools - Perftools-lite modules <i>Overview of the Cray Performance and Analysis toolkit for profiling applications.</i> <i>Demo: Visualization of performance data with Apprentice2.</i>	Thierry
09:40	30	Exercises (session #7)	
10:10	20	Break	
10:30	60	Advanced performance analysis <i>Automatic performance analysis and loop work estimated with perftools.</i> <i>Communication Imbalance, Hardware Counters, Perftools API, OpenMP.</i> <i>Compiler feedback and variable scoping with Reveal.</i>	Thierry
11:30	30	Exercises (session #8)	
12:00	75	Lunch break	
13:15	60	Understanding Cray MPI on Slingshot, rank reordering and MPMD launch <i>High level overview of Cray MPI on Slingshot, useful environment variable controls.</i> <i>Rank reordering and MPMD application launch.</i>	Harvey
14:15	30	Exercises (session #9)	
14:45	15	Break	
15:00	30	AMD Debugging	AMD
15:30	30	Exercises (session #10)	
16:00	30	Introduction to AMD Rocprof	AMD
16:30	30	Exercises (session #11)	
17:00	30	Open Questions & Answers Participants are encouraged to continue with exercises in case there should be no questions.	
17:30		End of the course day	

Day 4: Thursday 31/10 (times in CET)

Start	Duration	Item	Names
09:00	20	Python on HPE Cray EX Supercomputer GPU application porting strategies	Jean
09:20	40	Performance Optimization: Improving single-core efficiency	Jean
10:00	15	Exercises (session #12)	
10:15	15	Break	
10:30	60	I/O Optimisation - Parallel I/O <i>Introduction into the structure of the Lustre Parallel file system.</i> <i>Tips for optimising parallel bandwidth for a variety of parallel I/O schemes. Examples of using MPI-IO to improve overall application performance.</i> Advanced Parallel I/O considerations <i>Further considerations of parallel I/O and other APIs.</i> Being nice to Lustre <i>Consideration of how to avoid certain situations in I/O usage that don't specifically relate to data movement.</i>	Harvey
11:30	30	Exercises (session #13)	
12:00	60	Lunch break	
13:00	25	AMD Omnitrace	AMD
13:25	20	Exercises (session #14)	
13:45	25	AMD Omnipperf	AMD
14:10	20	Exercises (session #15)	
14:30	15	Break	
14:45	90	Best practices: GPU Optimization, tips & tricks / demo	AMD
16:15	30	LUMI support and LUMI documentation <ul style="list-style-type: none"> • <i>What can we help you with and what not? How to get help, how to write good support requests.</i> • <i>Some typical/frequent support questions of users on LUMI?</i> 	Jørn
16:45	30	Open Questions & Answers Participants are encouraged to continue with exercises in case there should be no questions.	
17:15		End of the course day	