Overview on OpenACC & OpenMP Device Capabilities

- **Directive-based accelerator programming: C/C++, Fortran**
- **OpenACC**
  - → Initiated by Cray, CAPS, PGI, NVIDIA
  - → 2011: specification v1.0
  - → 2013: specification v2.0
- **OpenMP**
  - → Broad (shared-memory) standard
  - → 2013: specification v4.0

Comparison of Constructs

OpenACC	OpenMP	Description of constructs/ clauses
parallel	target	offload work
parallel	teams, parallel	create in par. running threads
kernels		compiler finds parallelism
loop	distribute, do, for, simd	worksharing across parallel units
data	target data	manage data transfers (block)
enter data		unstructured data lifetime: to and from
exit data		the device
update	target update	data movement in data environment
host data		interoperability with CUDA/ libs
cache		advice to put objects to closer memory
tile		strip-mining of data
declare	declare target	declare global, static data
routine	declare target	for function calls
async(int)	task depend	async. exec. w/ dependencies
wait	taskwait	sync of streams/ tasks
async wait		async. waiting
parallel in parallel	parallel in parallel/ team	nested parallelism
device_type		device-specific clause tuning
atomic	atomic	atomic operations
	sections	non-iterative worksharing
	critical	block executed by master
	master, single	block executed by one thread
	barrier	synchronization of threads

We talk about the following specifications: OpenACC 2.0, OpenMP 4.0.