



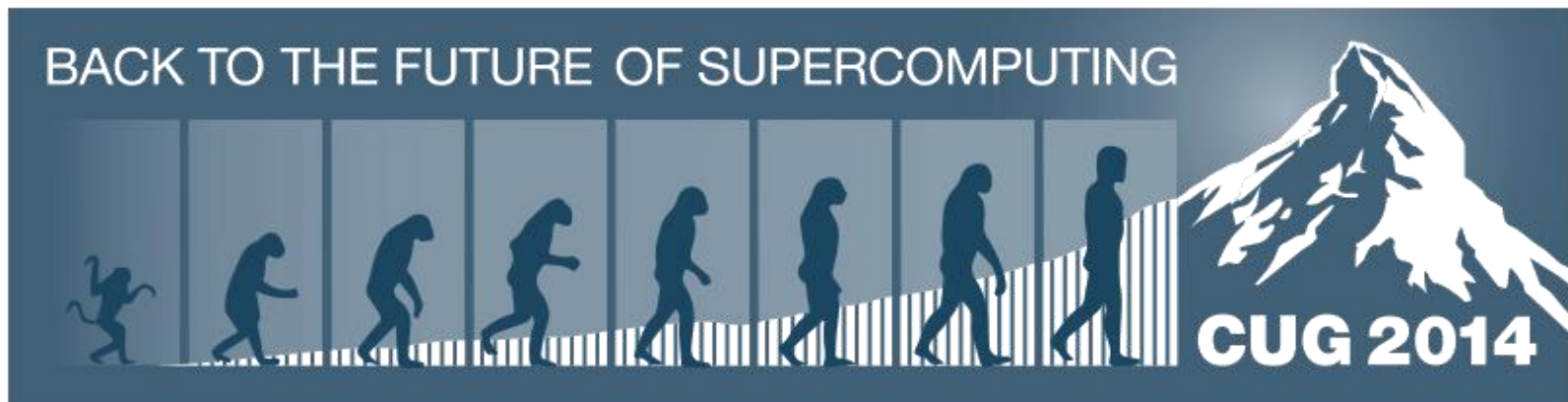
OpenACC vs. OpenMP4.0

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How did we get here

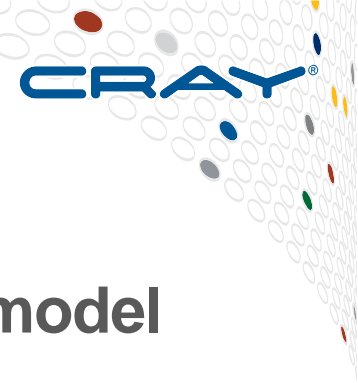
● A quick history of the human race

- The Stone Age
- PGI invent their Accelerator directive-based programming model
- CAPS invent their HMPP directive-based programming model
- The OpenMP accelerator subcommittee begins work
- Nvidia, PGI, Cray, CAPS launch OpenACC
- OpenACC goes to version 2.0
- OpenMP4.0 is standardised
- EuroHack15



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OpenMP4.0 device constructs

- **OpenMP4.0 has a directive-based programming model**
 - "device constructs"
- **Current status:**
 - more limited functionality than OpenACC v2.0
 - closer to OpenACC v1.0
 - more limited in compiler support
 - Cray compiler will support in upcoming v8.4
- **Prospects:**
 - Active discussions to increase functionality in OpenMP4.1
 - All OpenMP-compliant compilers will have to support it

Data regions

- **Structured data regions look very similar**
 - `acc data [data-clauses]`
 - `omp target data [data-clauses]`
- **Data clauses loop very similar**
 - `copyin(a) copyout(b) copy(c) create(d)`
 - `map(to:a) map(from:b) map(tofrom:c) map(alloc:d)`
- **Slightly different semantics**
 - `map(*:a)` is actually `present_or_*(a)`
 - There is no equivalent to `present` clause in OpenMP
- **Update directives are similar**
 - `acc data update host/device`
 - `omp target update to/from`
- **There are no unstructured data regions in OpenMP**



Kernels

- **"acc parallel"** maps closely to OpenMP4.0
 - OpenACC:
 - acc parallel [data-clauses]
 - acc loop
 - OpenMP
 - omp target [data-clauses]
 - omp teams
 - omp distribute
- Scalars are **shared** by default in OpenMP
 - but **firstprivate** in OpenACC



Things without an equivalent in OpenMP

- Not an exhaustive list

- unstructured data regions
- "acc kernels"
- host_data
- fine-grained control of loop scheduling
- async
 - Can use OpenMP tasks with dependencies



"So which should I use?"

- Now?
- In the future?