Hybrid Programming in MPI-3

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Status Update

- We have two proposals from the working group so far
  - Matched probe (Torsten Hoefler)
    - Presented at earlier Forum meetings
  - MPI Endpoints (Marc Snir)
    - Under discussion within the working group for a few months
    - Several drafts of the proposal reviewed and discussed
    - First presentation of the concepts today
  - Other proposals have been merged into the MPI Endpoints proposal (e.g., threads as processes proposal, interoperating with PGAS models)
    - Some other proposals (or subsets of proposals) have been dropped or held back for the time being

Relevant issues yet to be covered

- Interoperating with other models
  - MPI + CUDA/OpenCL
    - Being studied by Purushotham Bangalore
  - MPI + PGAS (as processes)
    - Being studied by Abhinav Vishnu
  - MPI + TBB/Ct
    - Being studied by Alexander Supalov
  - Interoperating with higher-level models above MPI
    - We have not yet decided if this will be covered by the working group
    - Jeff Squyres and Torsten Hoefler will present details at one of the future working group telecons

Other discussion items

- Who will manage resources in hybrid models?
  - E.g., how many processes and how many threads?
  - Discussed: the working group mostly considers this to be out-of-scope for MPI (or at least MPI-3)
- Differentiating thread package flavors
  - MPI does not distinguish thread packages (e.g., pthreads vs. Windows threads vs. Solaris threads)
  - MPI implementations have to be given this information out-of-band (e.g., through configure options)
  - This is needed to access thread-local storage, locks, etc.
    - Should MPI-3 continue to ignore this aspect?
    - Should the user specify how to access it as a part of MPI-3?

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