Collectives Working Group
– April’08 Report and Discussions –

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We will propose a new interface that is able to handle topological/sparse, non-blocking and persistent collective operations and only adds one new interface function per collective.
Topological/Sparse Collectives (Jesper, Torsten)
Non-Blocking Collectives (Torsten)
Persistent Collectives (Jesper, Torsten, Christian)
Dynamic-sized (Vector) Collectives (Hans-Joachim, Alexander)

All-in-one sentence

We will propose a new interface that is able to handle topological/sparse, non-blocking and persistent collective operations and only adds one new interface function per collective.
MPI_Bcast_init(..., group, info, request) supports:
- non-blocking
- sparse/topological
- persistent
- multiple optimization possibilities

several open issues, for example:
- tags?
- ordering in startall?
- re-using MPI_Requests?
- ... some more

⇒ join our discussions on Wed. 9:30am
MPI_Bcast_init(..., group, info, request)

general:
- _init calls are collective (also if rank is not in group)
- _init calls can involve communication or not

the MPI_Group argument:
- assembled process-local
- (in/out) data-ordering is determined by order in group
- must be identical on all ranks

the MPI_Info argument:
- allows hints to the implementation
- e.g., can the _init call be collective?
Info Hints

- **coll_init**: _init call can be collective (enables collective schedule optimization)
- **no_coll_init**: force _init call to be local (reduces number of synchronization points)
- **non-blocking**: optimize for non-blocking usage (overlap computation)
- **blocking**: optimize for lowest latency in the blocking case (no overlap needed)
- **reuse**: similar arguments will be reused (e.g., group and sizes stay identical, only addresses are changed)
- **previous**: look for a similar operation in cache
Topologies

- enable optimized process mapping
- changes to enhance scalability:
  - MPI_Graph_create will only accept a neighbor list
  - represent more general directed graph (change in MPI-2.1?)
  - query functions will not have rank argument
- group query functions:
  - get a neighbor group from a communicator (for sparse collectives)
  - convenience function to encourage graph/cart usage
  - MPI_Cart_neighbor_group(selected_dims, distance, comm, group)
  - MPI_Graph_neighbor_group(comm, group)
Open Questions

- tags?
- using MPI_Requests?
Dynamic-sized Collectives

Hans-Joachim, Alexander?