Virtual Topologies for MPI Processes

Changes and corrections in MPI 4.1

MPI Forum Meeting, September 2023, Bristol, UK

On behalf of the Topologies Chapter Committee

MPI Forum

Chapter committee

Current chapter committee members:

- Christoph Niethammer
- Claudia Blaas-Schenner
- Guillaume Mercier
- Tony Skjellum
- Torsten Höfler

Issues addressed with MPI 4.1

#412 Update topology examples 8.8 and 8.10 **OK**
#457 Improvements around the word 'rank' in the Process Topologies chapter **OK**
#605 Topologies - Add Example Titles **OK**
#556 MPI_Cart_Coords maxdims/ndims mixup missing from MPI 3.1 to MPI 4.0 (Errata) **OK**
#644 Update 'Process Topology' chapter title to use 'MPI process' **OK**
#648 Topology LIS text improvements **OK**
#649 Topology - use of \MPI process where necessary **OK**
#650 Topology improvement around the term virtual topology **OK**
#651 Topology typos and smaller text improvements **OK**

mentionable other/editor changes:

- '==' ⇒ '='
- some macro updates (e.g., \const ⇒ [\error | \mpiconst,...])
- small code example updates

OK means "changes were merged and are present in RC1"

Diffs between MPI-4.0 and MPI-4.1

Latexdiff version:
https://drive.google.com/file/d/1LwRLnTCg-7eFhQn1Gf-sA3V8HC-c1nO-/view?usp=sharing

Online pdf diff at draftable:
https://draftable.com/compare/yAsVnzBJNFus

Github diff:
https://github.com/mpi-forum/mpi-standard/compare/mpi-4.0...mpi-41-rc1 ⇒ search ‘topol.tex’ ⇒ load

git commands:

full diff:

```
git diff --word-diff mpi-4.0..mpi-41-rc1 -- topol.tex
```

all single-commit check:

```
for c in $(git log --no-merges --format='%h' mpi-4.0..mpi-41-rc1 -- topol.tex); do git show --word-diff $c -- topol.tex; done
```

MPI Forum

Errata #556: MPI_Cart_Coords maxdims/ndims mixup missing from MPI 3.1 to MPI 4.0

MPI-3.1

IN	maxdims	length of vector coords in the calling program (integer)
OUT	coords	integer array (of size ndims) containing the Cartesian coordinates of specified process (array of integers)

MPI-4.0

IN	maxdims	length of vector coords in the calling program (integer)
OUT	coords	integer array (of size maxdims) containing the Cartesian coordinates of specified process (array of integers)

MPI-4.1rc1

IN	maxdims	length of vector coords in the calling program (integer)
OUT	coords	coordinates of the MPI process with the rank rank in Cartesian structure (array of integers)

The inverse mapping, rank-to-coordinates translation is provided by MPI_CART_COORDS. If comm is associated with a zero-dimensional Cartesian topology, coords will be unchanged. If maxdims is less than the number of dimensions of the Cartesian topology associated with the communicator comm, the outcome is unspecified.

7. Section 8.5.5 on page 397 and MPI-4.0 Section 8.5.5 on page 403.
   The unintended change in the specification of argument coords in MPI_CART_COORDS in MPI-4.0 is reverted to the original meaning in MPI-1.1 to MPI-3.1. It is clarified that the outcome of MPI_CART_GET and MPI_CART_COORDS is unspecified for the case that maxdims is less than ndims.

MPI Forum

Findings during MPI 4.0rc1 review

(fixes ready)

- (currently missing RC1 feedback for first part)

- “key-value info pairs” ⇒ “(key,value) info pairs” following other chapters [to discuss]

- inconsistent writing of all(-)to(-)all[-w] (p. 436 vs pp. 438/439) ⇒ alltoall[w]
- Figure caption missing full-stop [to discuss]

- Typo in chapter name in introduction
- “2” ⇒ “two”
- “size” ⇒ “number of nodes”
- “vectors” ⇒ “arrays”
- some overlooked “topology structure” ⇒ “associated virtual topology” during LIS update in #648 [to discuss]
- [all chapters] Fixing chapter numbering for subchapter builds [to discuss]

https://github.com/mpi-forum/mpi-standard/pull/876/files

Findings during MPI 4.0rc1 review

(fixes to be done / consider)

Formating:

- p.7 l.48/p.8 l.1 page break: keep advice text and list together

General comment:

- p. 392, lines 34-38, and on p. 394, lines 42-46, the advice to implementors and the rationale about MPI_UNWEIGHTED appear somewhat contradictory. I would be inclinded to remove the rationale."

Forum Feedback 14/09/23: Leave as is

Advice to implementors. It is recommended that MPI_UNWEIGHTED not be implemented as NULL. (*End of advice to implementors.*)

Rationale. To ensure backward compatibility, MPI_UNWEIGHTED may still be implemented as NULL. See Annex B.4. (*End of rationale.*)

Advice to implementors. It is recommended that MPI_UNWEIGHTED not be implemented as NULL. (*End of advice to implementors.*)

MPI Forum