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



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



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:

<u>https://github.com/mpi-forum/mpi-standard/compare/mpi-4.0...mpi-41-rc1</u> ⇒ search 'topol.tex' ⇒ load

git commands:

```
# full diff:
```

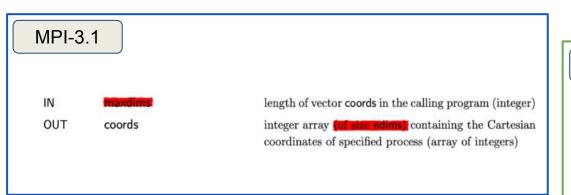
git diff --word-diff mpi-4.0..mpi-41-rc1 -- topol.tex

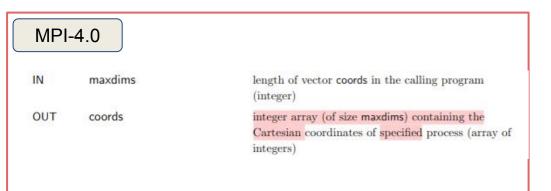
all single-commit check:

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



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





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.



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."

