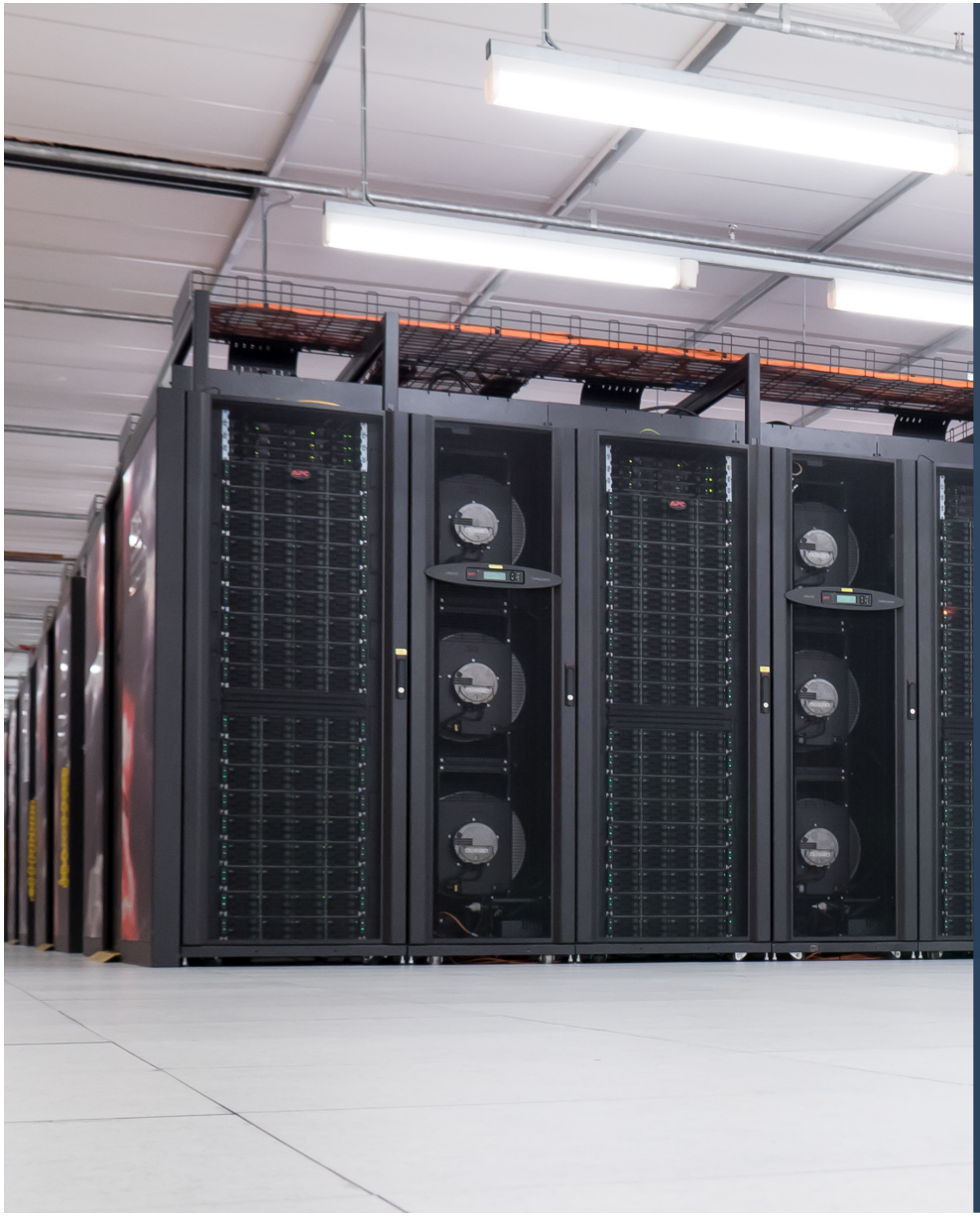

# PARALLEL COMPRESSION BENCHMARK OF MOM5

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# TEST_MPP_IO BENCHMARK

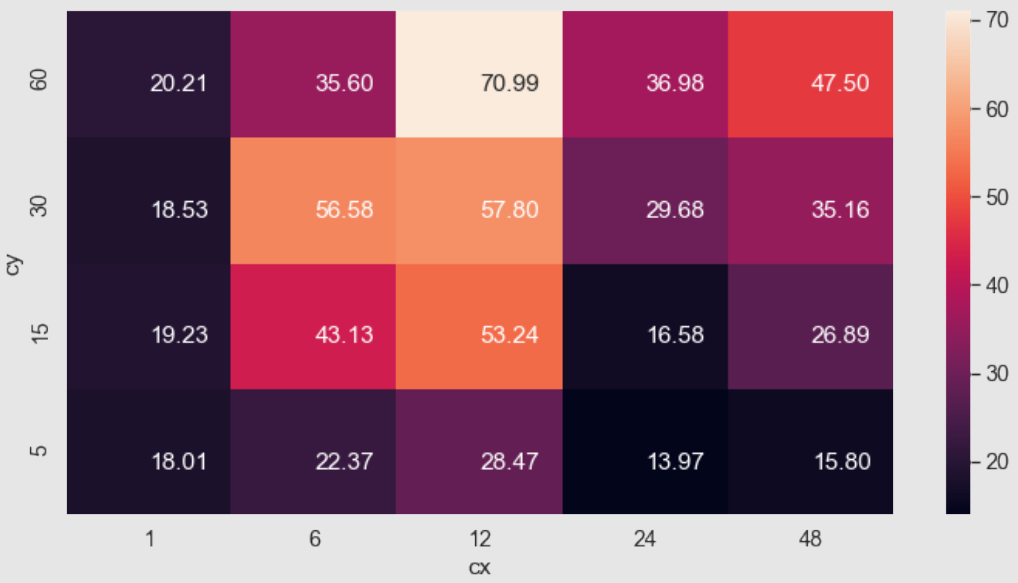
| | |
|---|---|
| Variable Size | X = 3600 ; Y = 2700 ; Z = 50 ; T = UNLIMITED ; // (48 currently) |
| File Size | Non-compression: 174GB<br>Deflation level 4: 74GB |
| PEs | 720 and 1440 |
| MPI-IO | ROMIO and OMPIO |
| HDF5 | v1.10.x and v1.12.x |

```
&mpp_io_nml
parallel_netcdf = .true.
pnetcdf = .false.
io_clocks_on = .true.
parallel_chunk = .true.
chunk_layout= 12,30
deflate_level= 4
```

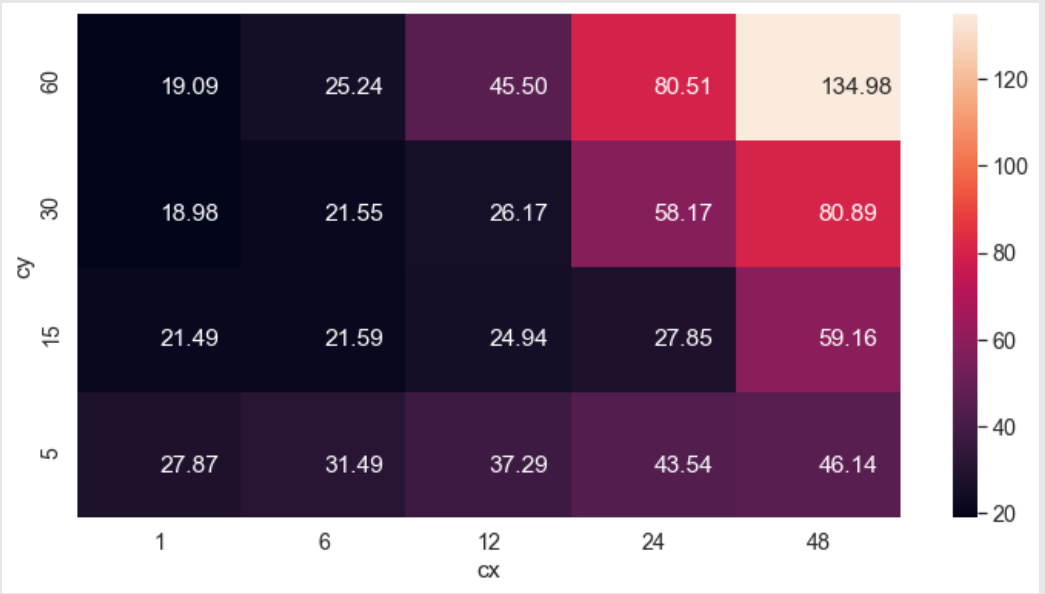
The best settings of PE layout and I/O layout with the default chunk layout:

- 720 PE: PE layout = (48,15); IO layout= (24,15)
- 1440PE: PE layout = (48,30); IO layout= (12,30)

# 720 PE CHUNK LAYOUTS: LAYOUT =(48,15) I/O LAYOUT=(24,15)

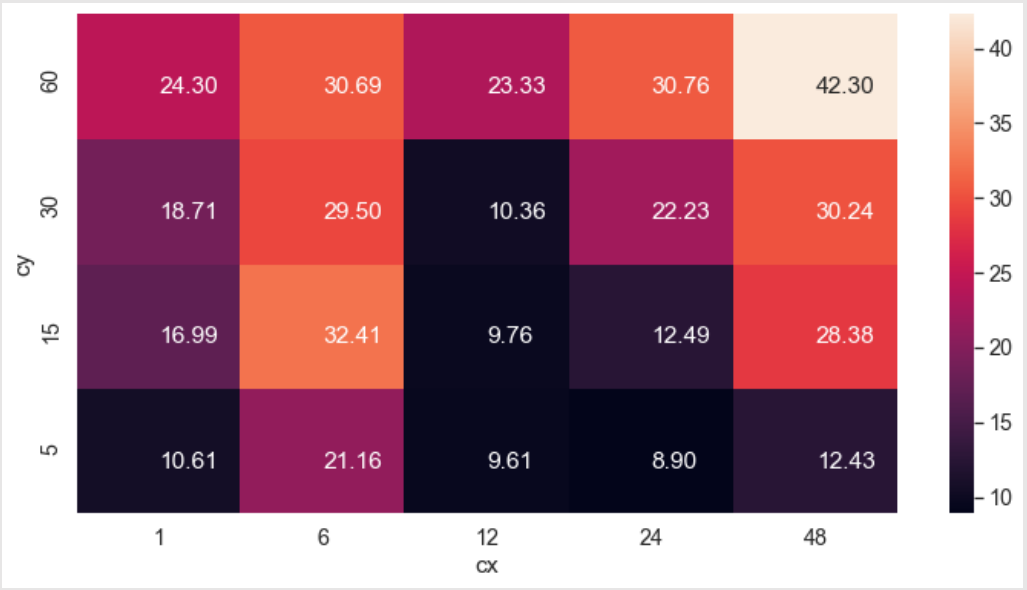


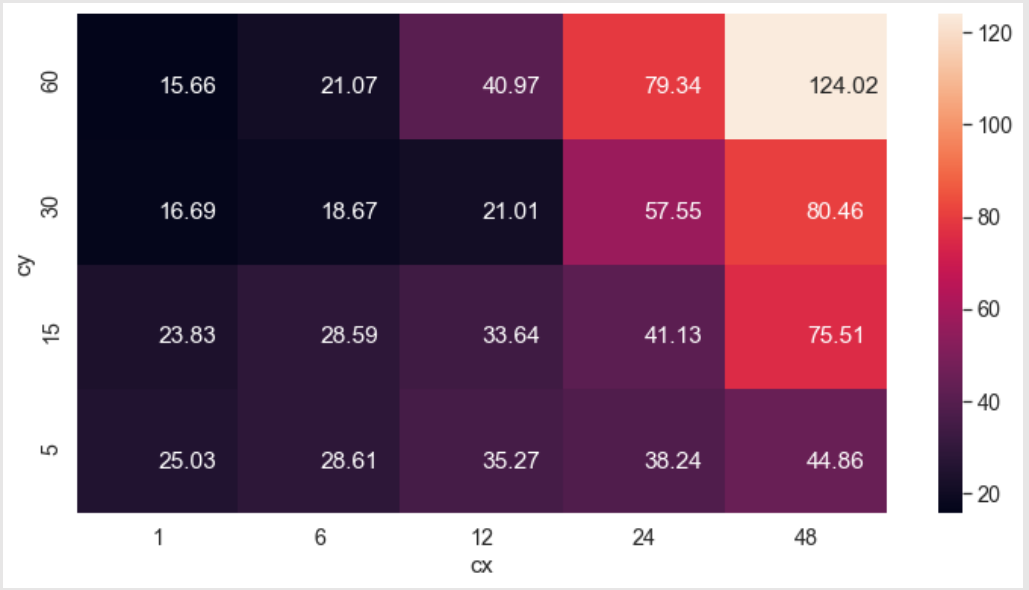

Non compression: (24*5), (24*15)




Deflation level 4: (1*30), (1*60)

# 1440 PE CHUNK LAYOUTS: LAYOUT =(48,30) I/O LAYOUT=(12,30)




Non compression: (12*5), (24*5)

Deflation level 4: (1*30), (1*60)

# 0.1° MODEL PARALLEL COMPRESSION BENCHMARK (720PE)

| Deflation Level | Chunk layout | File size | Stripe count | Mpp_write time | Non-I/O time | Total_time |
|---|---|---|---|---|---|---|
| **0** | 24*15 | 2.6TB | 30 | 1561.76 | 1003.61 | 2565.37 |
| | | | 60 | 2268.2 | 1341.6 | 3609.80 |
| | | | 90 | 1271.9 | 979.62 | 2251.52 |
| | | | 120 | 1675.45 | 931.28 | 2606.73 |
| **4** | 1*60 | 845GB | 60 | 684.27 | 806.06 | 1490.33 |
| | | | 90 | 928.16 | 810.78 | 1738.94 |

Layout =(48,15) I/O layout=(24,15)

# 0.1° MODEL PARALLEL COMPRESSION BENCHMARK (1440PE)

| Deflation Level | Chunk layout | File size | Stripe count | Mpp_write time | Non-I/O time | Total time |
|---|---|---|---|---|---|---|
| 0 | 24*15 | 2.6TB | 30 | 1200.77 | 506.75 | 1707.52 |
| | | | 60 | 2704.66 | 509.12 | 3213.78 |
| | | | 90 | 1533.8 | 366.11 | 1899.91 |
| 4 | 1*60 | 845GB | 30 | 801.64 | 365.35 | 1166.99 |
| | | | 60 | 767.48 | 376.52 | 1144.00 |

Layout =(48,30) I/O layout=(12,30)

# OBSERVATIONS

- Large measurement variability in I/O intensive benchmark.
- Use HDF5 v1.12.x for parallel compression.
- Use OMPIO for non-compression parallel I/O.
- Similar parallel compression performance between OMPIO and ROMIO.