

Flexible Workflows for High-Resolution Climate Digital Twins

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Destination Earth

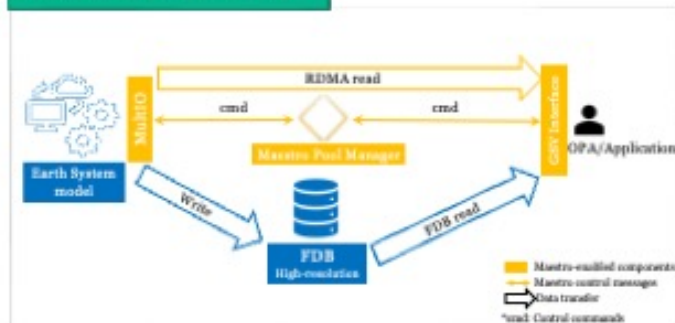
Climate and Weather
Earth Digital Twins

Model, Monitor & Simulate
natural phenomena,
related human activities,
and hazards

Lumi,
Leonardo,
MareNostrum
EuroHPC systems

115 Partners - 27 EU Countries
431M Hrs CPU + 30M Hrs GPU
Global Resolution: **5 km → 1 PB/day**

End-to-End Workflow



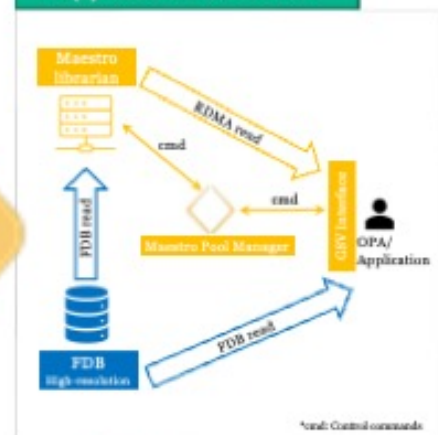
Peer-to-Peer Transport



Maestro orchestrates data in scientific workflows,
allowing the movement of core data objects (CDO) by
direct RDMA communication, bypassing the file system



Application Workflow



Maestro core

<https://github.com/maestro-data/maestro-core>

Documentation

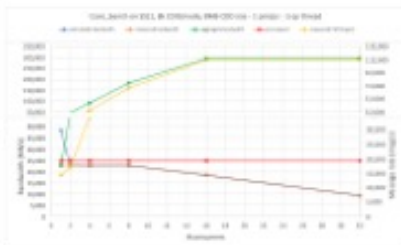
<https://maestro-data.github.io/maestro-core/>

Maestro-core Benchmark

• Wire speed
transport up
to 16 nodes

• Pool manager
processes
110k msg/s

• Aggregated
bandwidth of **300
GB/s** for 8 MB CDOs



• Preliminary results show **9.7x** speed
up for DestinE Application Workflow

Workflow Data Notification

