

Computations Performed at UniBwM

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Local Computing Hardware



Universität der Bundeswehr München

Professur für Numerische Methoden
in der Luft- und Raumfahrttechnik

Apollo Cluster

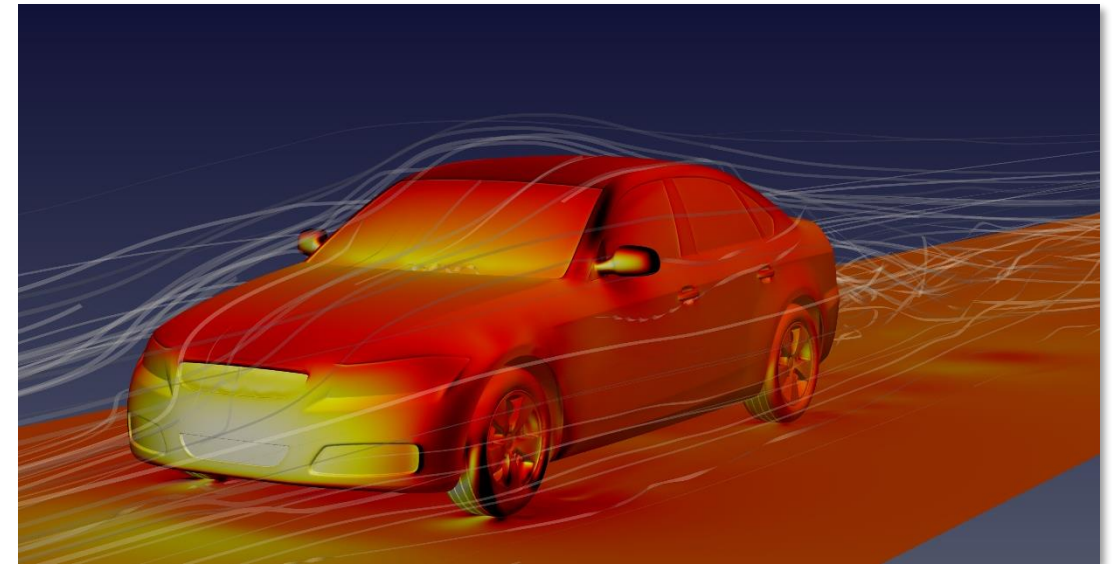
- 2752 Cores Xeon Broadwell/Cascade Lake
- 32 Cores / 64GB RAM per node
- 40Gbit/s Infiniband
- 19" Chassis, Air Cooling
- Hosted in Container

LUNA Cluster

- 5120 Cores EPYC Rome
- 128 Cores / 512GB RAM per node
- 100Gbit/s Infiniband
- OCP Rack
- Direct Liquid Cooling



- Variation of compiler and MPI
 - gcc-7.5 (OpenSUSE default), gcc-10 (Apollo) , gcc-14 (LUNA), icx
 - OpenMPI 4 (Apollo), OpenMPI 5 (LUNA), IntelMPI
 - Fine mesh case
- Scaling from 64 to 2048 processes
 - Xeon: 64 – 512
 - EPYC: 128 – 2048
 - Coarse mesh case



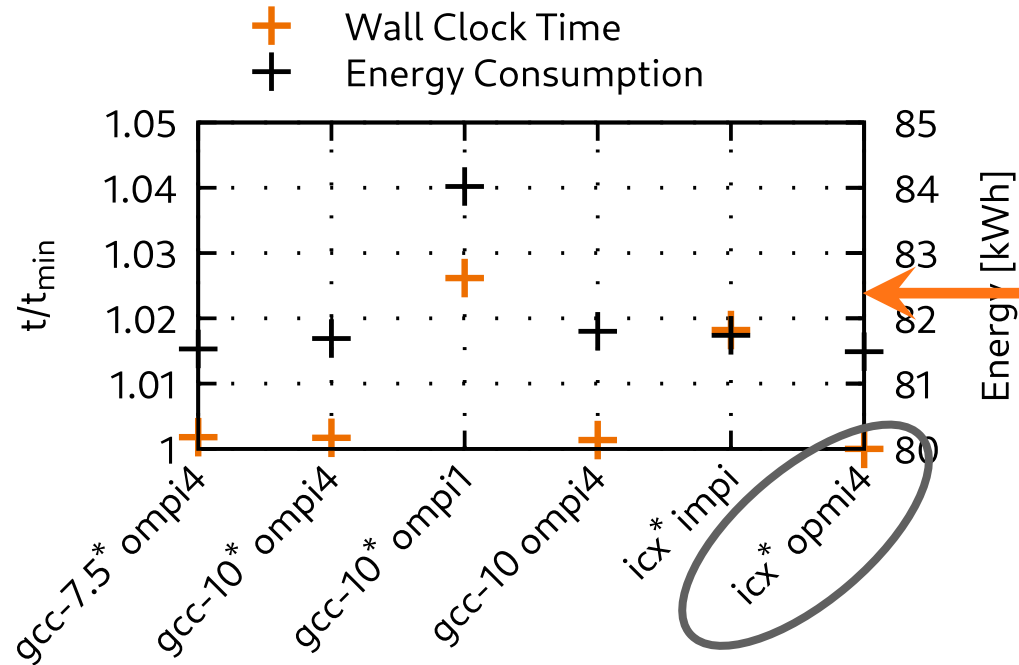
Apollo Cluster (Xeon)



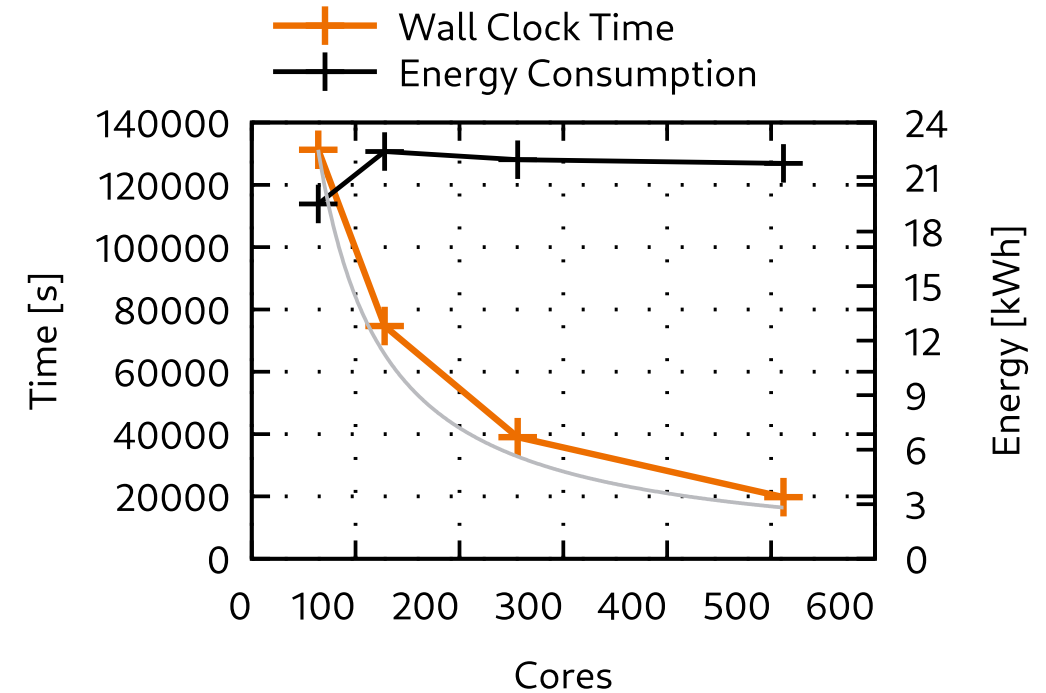
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Compiler / MPI
fine mesh



Scaling
coarse mesh



*: --march=broadwell --mtune=broadwell



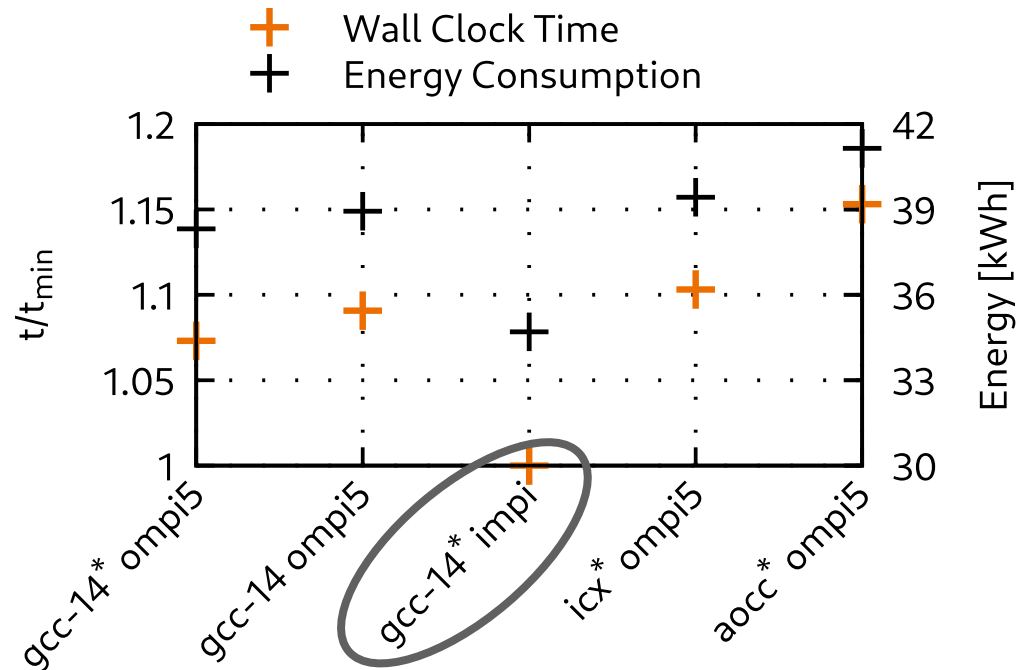
LUNA Cluster (EPYC)



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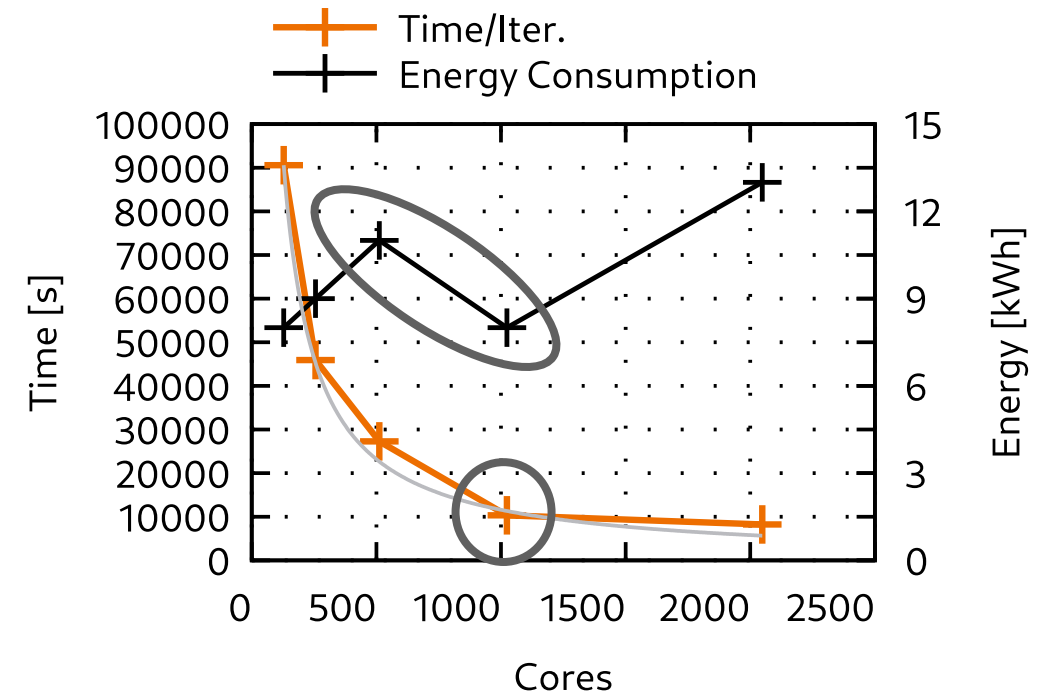
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Compiler / MPI *fine mesh*



*: --march=znver2 --mtune=znver2

Scaling *coarse mesh*



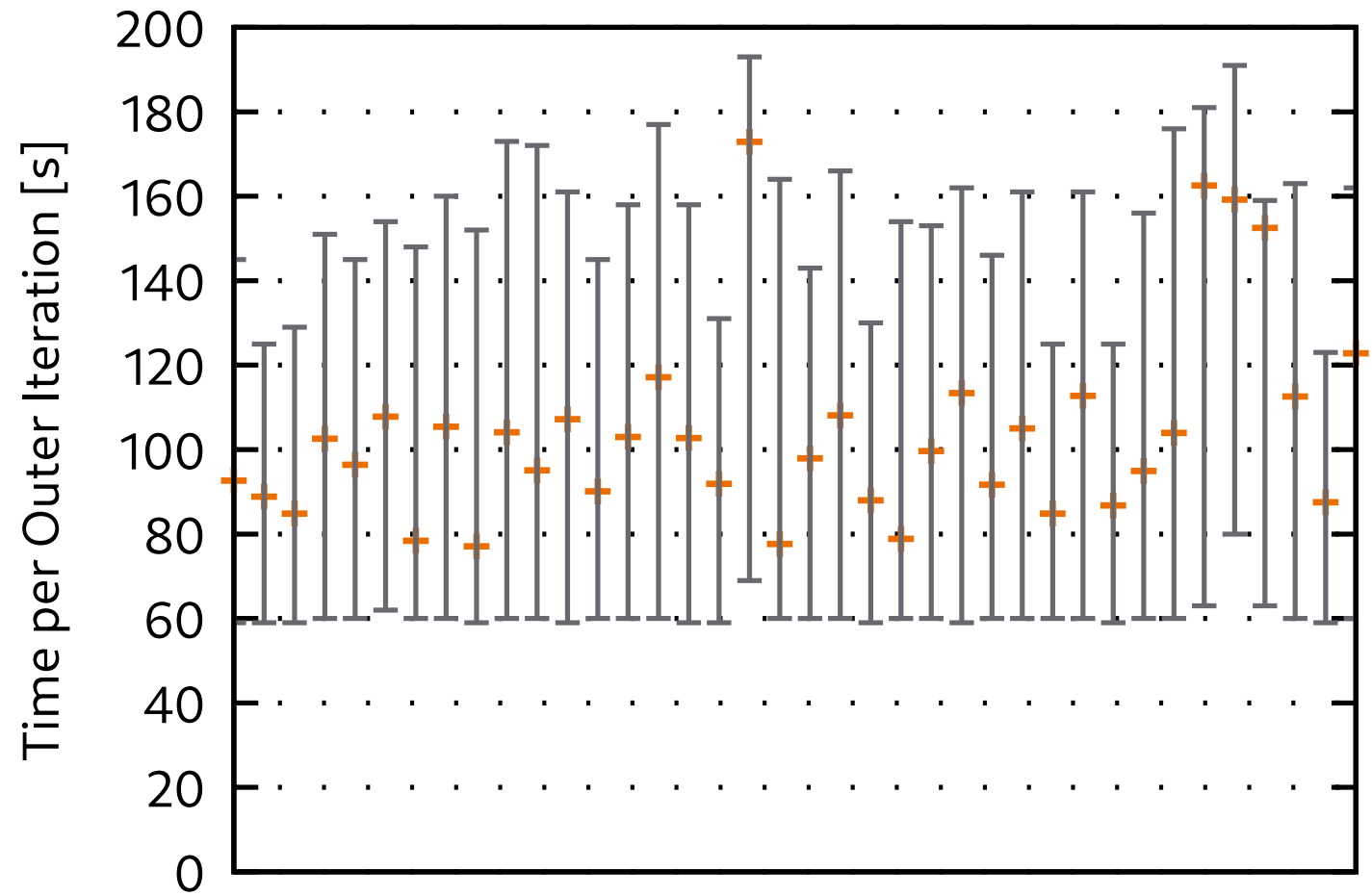
EPYC – Single Node (128 Cores)



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- All nodes show different times
- Minimum time is mostly similar
- It is not cooling, frequencies do not change

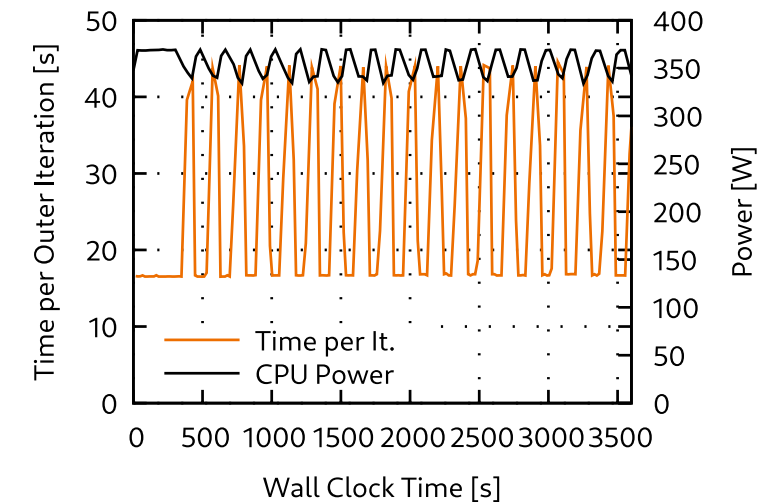
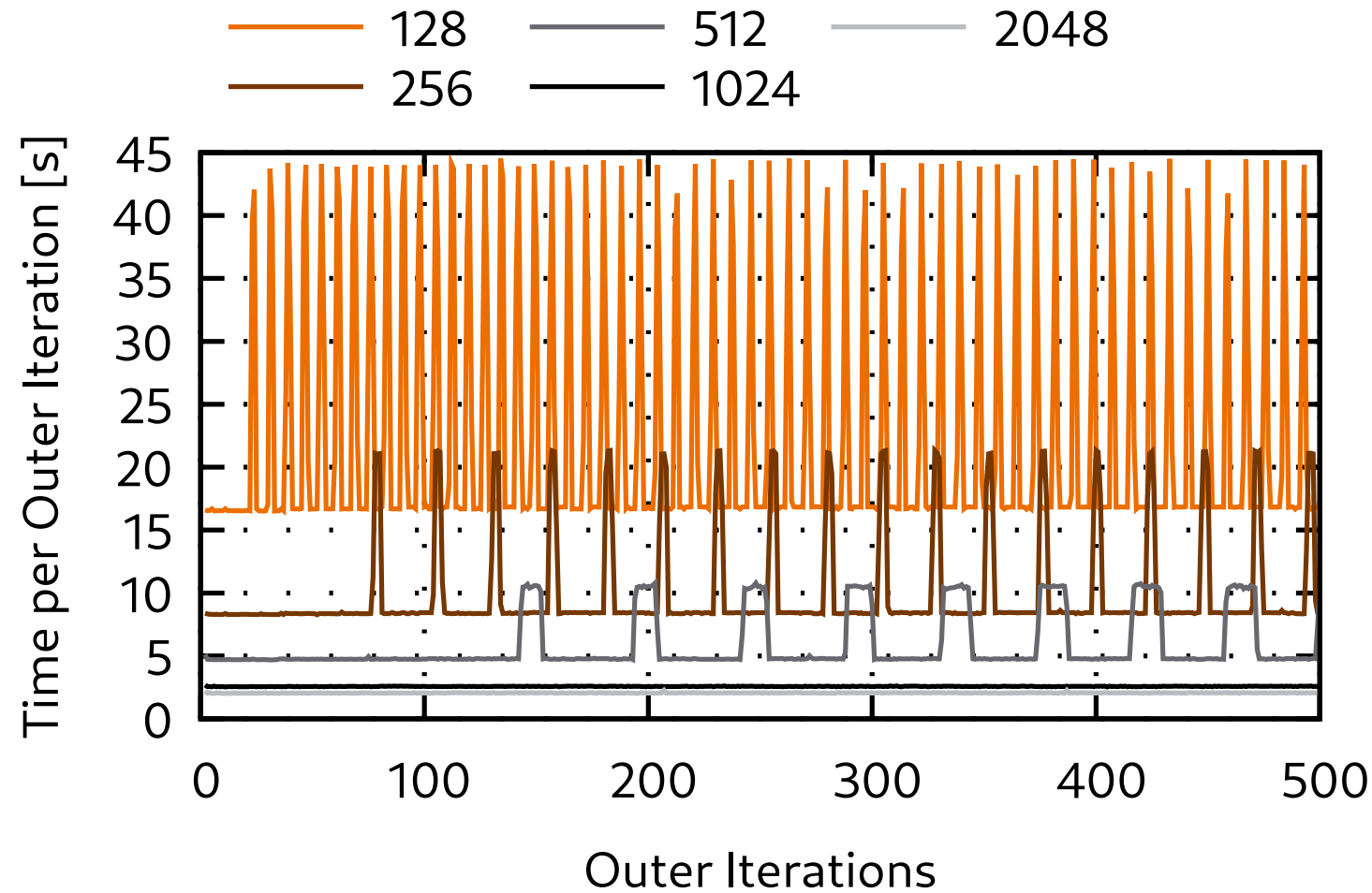


EPYC – Time Variation



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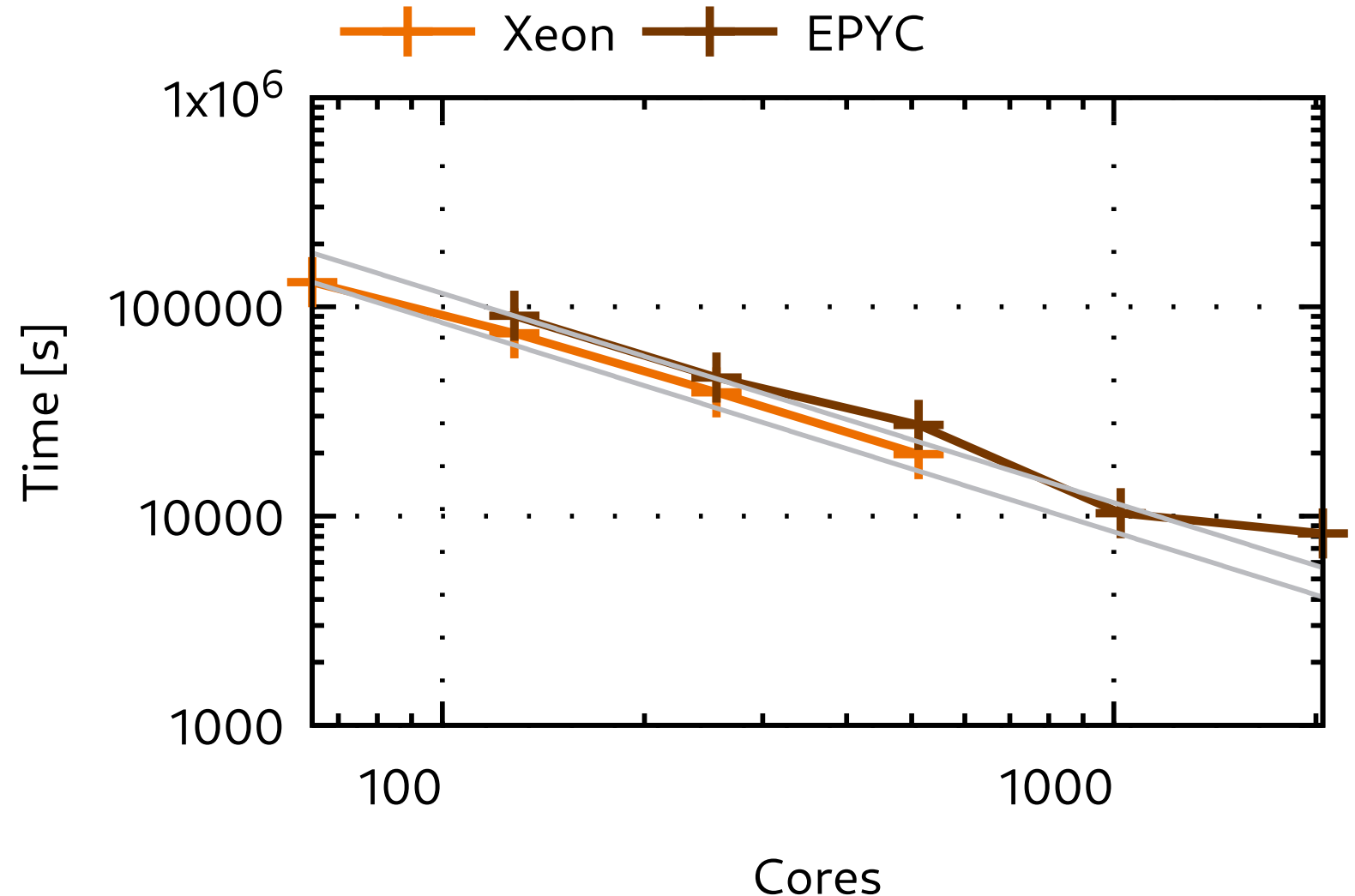
Overall Scaling Performance



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- Coarse mesh
- Overall scaling looks good up to 1024 processes



Conclusions



- Apollo (Xeon)
 - Scales well
 - Fastest with OpenMPI 4
 - Choice of compiler less relevant
- LUNA (EPYC)
 - Drop of calculation speed for high cells per process count
 - Strongly reduced power consumption
 - gcc-14 + Intel MPI provides fastest times

