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ANSYS Fluent
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KRONOS

workstations

KRONOS 810 SYSTEM

The world’s fastest per core ANSYS system

Index

Benchmark Terminology

Solver Rating:

Rating is the primary metric used to report performance results of the Fluent Benchmarks. It is defined as the number of benchmarks that can be run on a given machine (in sequence) in a 24 hour period. It is computed by dividing the number of seconds in a day (86400 seconds) by the number of seconds required to run the benchmark. A higher rating means faster performance.

System Specs and Configuration

KRONOS 810S

System Specifications

6 cores Intel i7 running at 4.8GHz

64GB memory (8x8GB)

2 x 256GB SSD SATA III RAID 0

Infiniband 40Gb/s Interconnect

CLUSTER (5x KRONOS 810S)

System Specifications

30 Cores Intel i7 running at 4.8GHz

320GB memory (5x64GB)

5 x (2 x 256GB – RAID 0) SSD SATA III

Infiniband 40Gb/s Interconnect

Software version used: ANSYS Fluent 14.0

Test #1 - Single-Stage Turbo-machinery Flow

- **Problematic:**
  - Number of cells: **500K**
  - Cell type: **Mixed**
  - Model: **Spallart-Allmaras turbulence**
  - Solver: **Coupled implicit**
  - Solver rating based on 25 iterations

Link to official ANSYS results

Test #1 - Single-Stage Turbo-machinery Flow

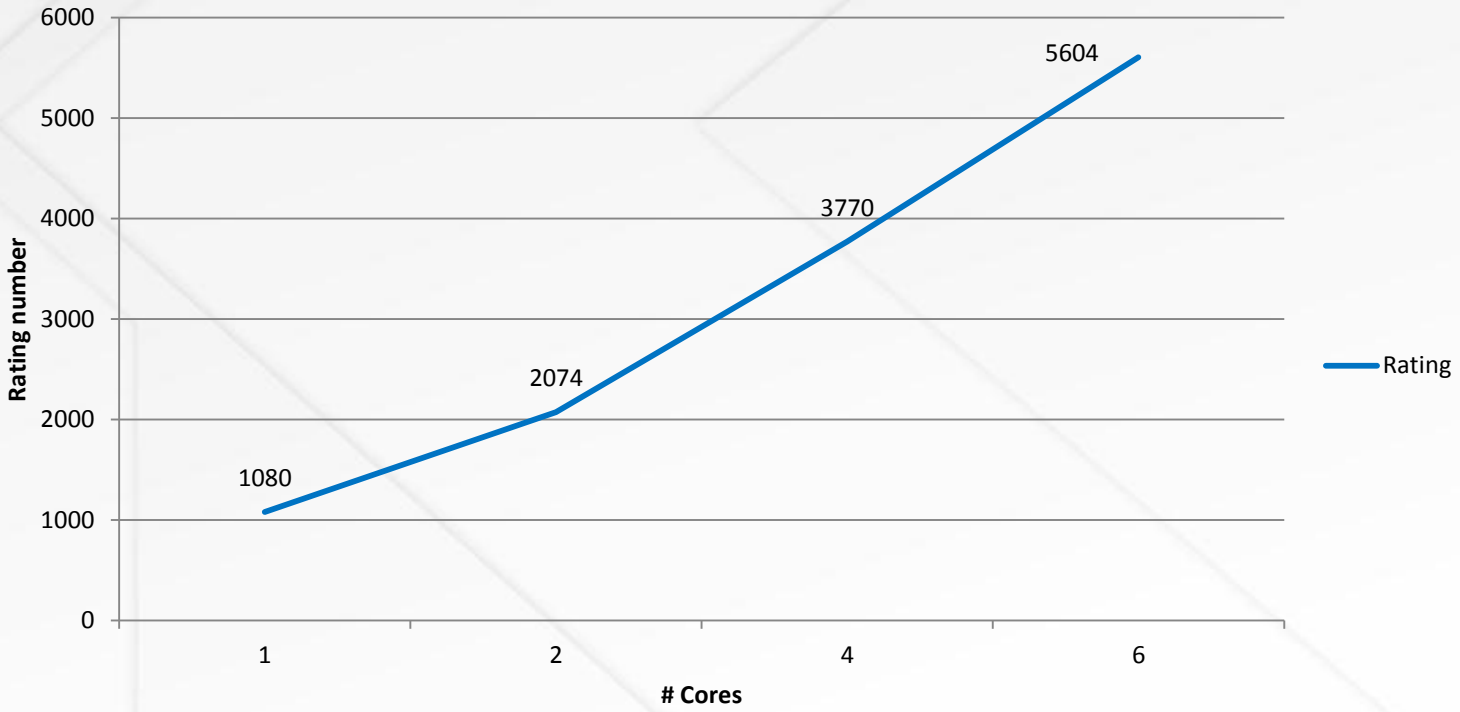
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
1	192	1080	**1.00**
2	100	2074	**1.92**
4	55	3770	**3.49**
6	37	5604	**5.19**

Elapsed Time (sec) - Lower is better

Test #1 - Single-Stage Turbo-machinery Flow

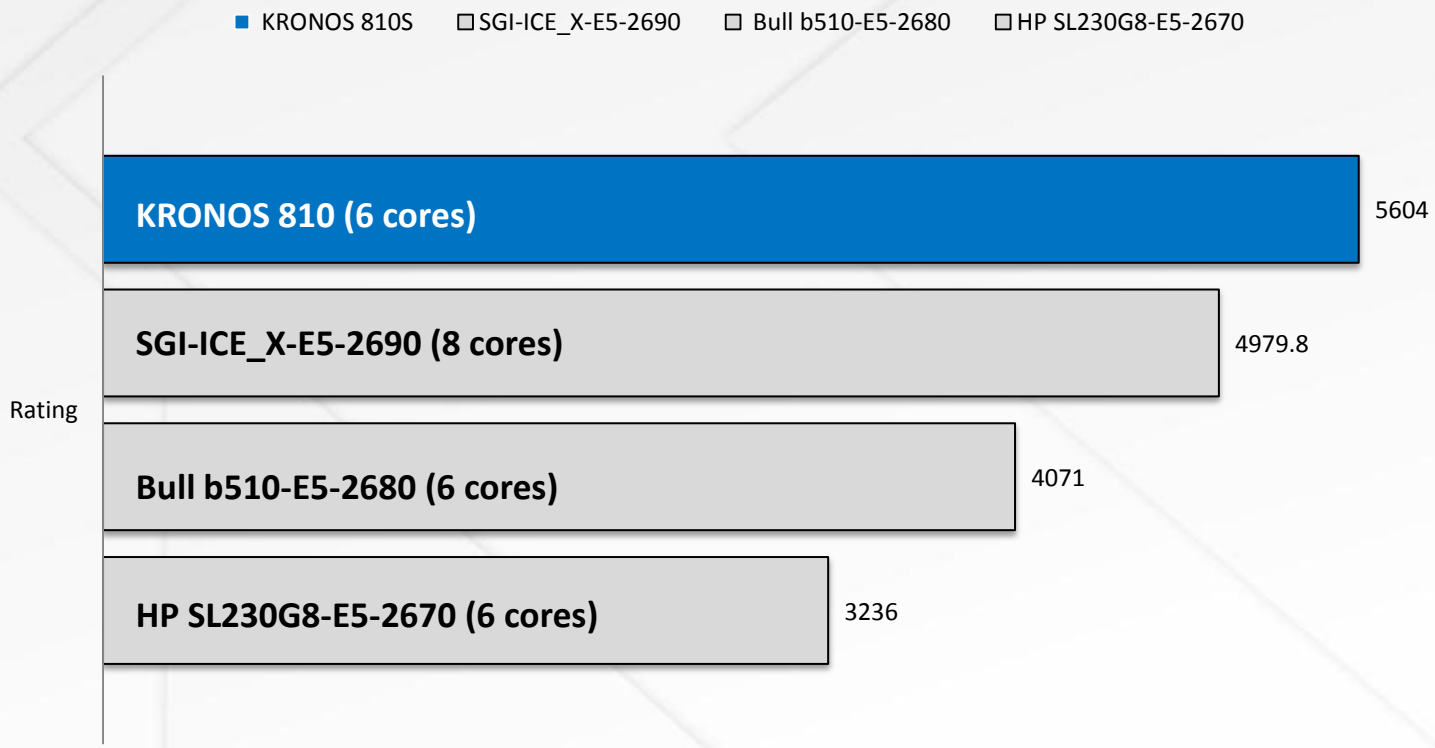
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #1 - Single-Stage Turbo-machinery Flow

KRONOS 810 vs. Competition:



Rating number – Higher is better

Bull B510 with Intel E5-2680 processor, 2.7GHz,64Gb, RHEL6 using QDR Infiniband with Turbo mode
HP SL230G8 with Intel E5-2670 processor, 2.6GHz, 64Gb_1333Mhz Memory, RHEL 6.2 using FDR Infiniband without Turbo mode
SGI ICE with Intel E5-2690 processor, 2.9GHz, 128Gb_1333Mhz Memory, SLES11-SP1 using Infiniband without Turbo mode

Test #2 - External Flow Over an Aircraft Wing

- **Problematic:**
  - Number of cells: **1.8M**
  - Cell type: **Hexahedral**
  - Model: **Realizable k-eps turbulence**
  - Solver: **Coupled Implicit Solver**
  - Solver rating based on 25 iterations

Link to official ANSYS results

Test #2 - External Flow Over an Aircraft Wing

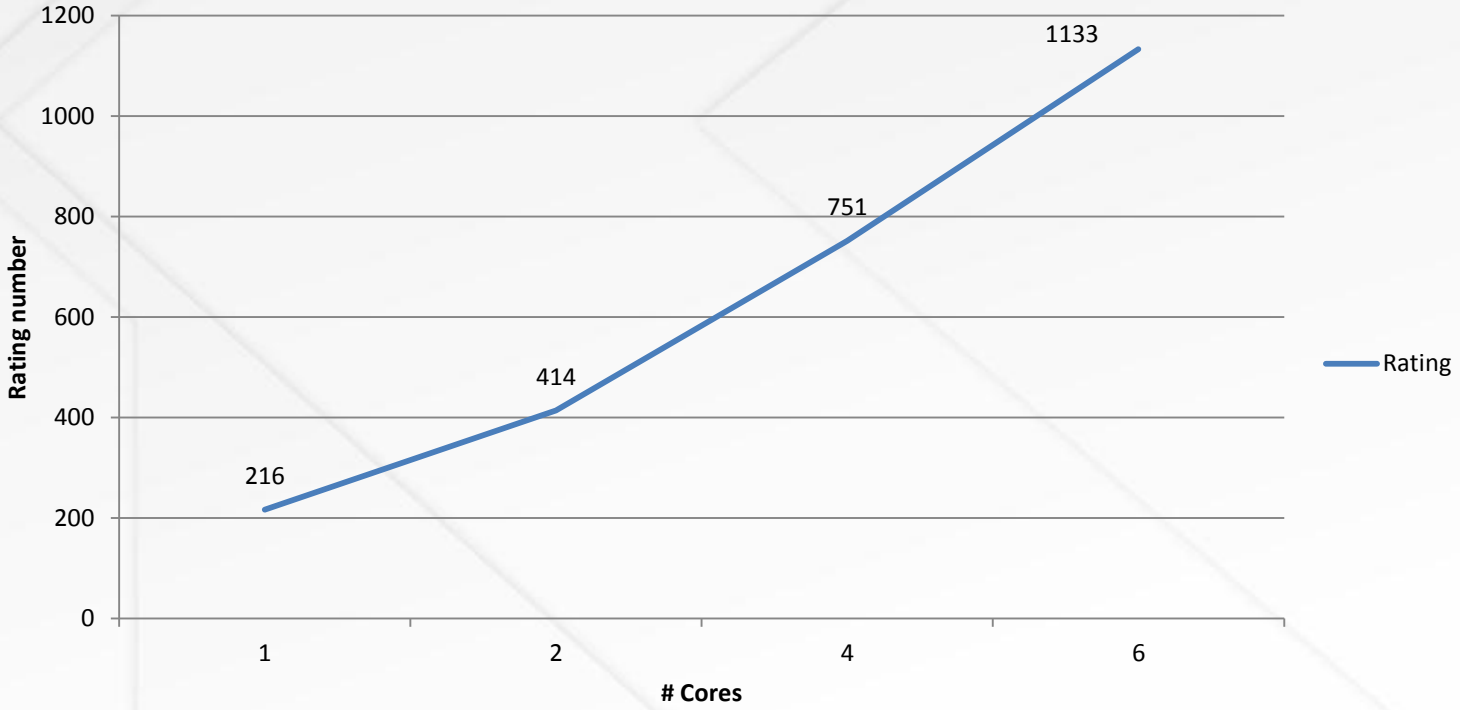
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
1	958	216	**1.00**
2	501	414	**1.91**
4	276	751	**3.47**
6	183	1133	**5.23**

Elapsed Time (sec) - Lower is better

Test #2 - External Flow Over an Aircraft Wing

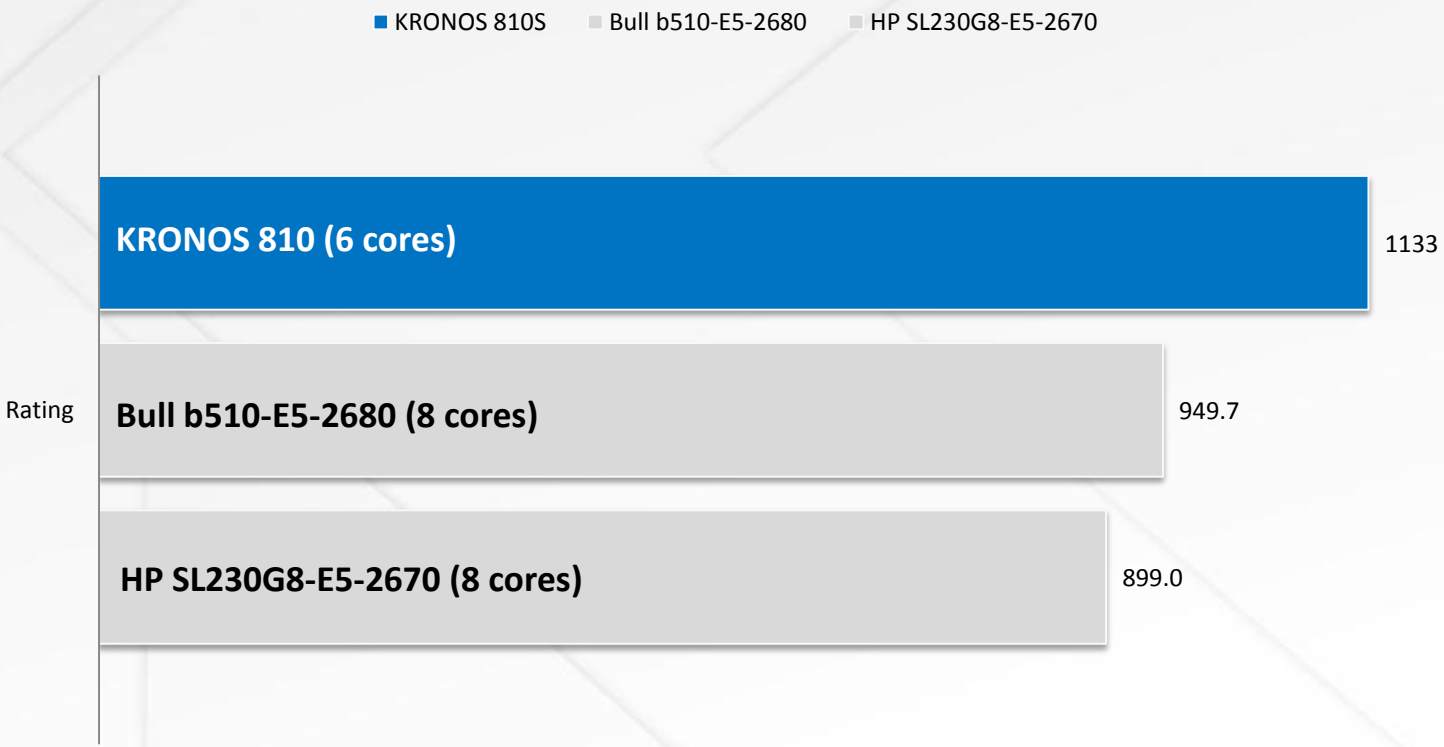
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #2 - External Flow Over an Aircraft Wing

KRONOS 810 vs. Competition:



Rating number – Higher is better

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HP SL230G8 with Intel E5-2670 processor, 2.6GHz, 64Gb_1333Mhz Memory, RHEL 6.2 using FDR Infiniband without Turbo mode

Test #3 - External Flow Over a Passenger Sedan

- **Problematic:**
  - Number of cells: **3.6M**
  - Cell type: **Mixed**
  - Model: **k-eps turbulence**
  - Solver: **Pressure-based coupled implicit**
  - Solver rating based on 25 iterations

Link to official ANSYS results

Test #3 - External Flow Over a Passenger Sedan

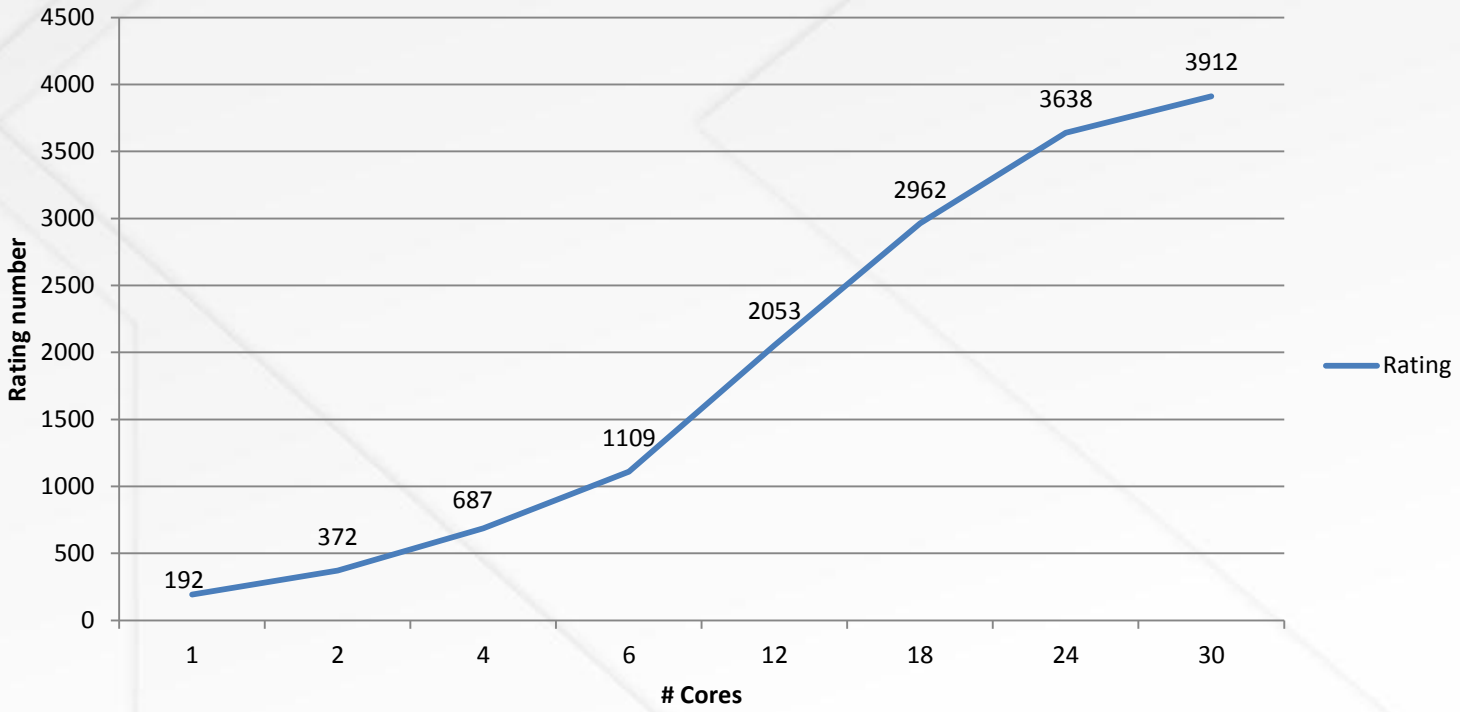
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
1	1081	192	**1.00**
2	558	372	**1.94**
4	302	687	**3.58**
6	187	1109	**5.78**
12	101	2053	**10.70**
18	70	2962	**15.44**
24	57	3638	**18.96**
30	53	3912	**20.40**

Elapsed Time (sec) - Lower is better

Test #3 - External Flow Over a Passenger Sedan

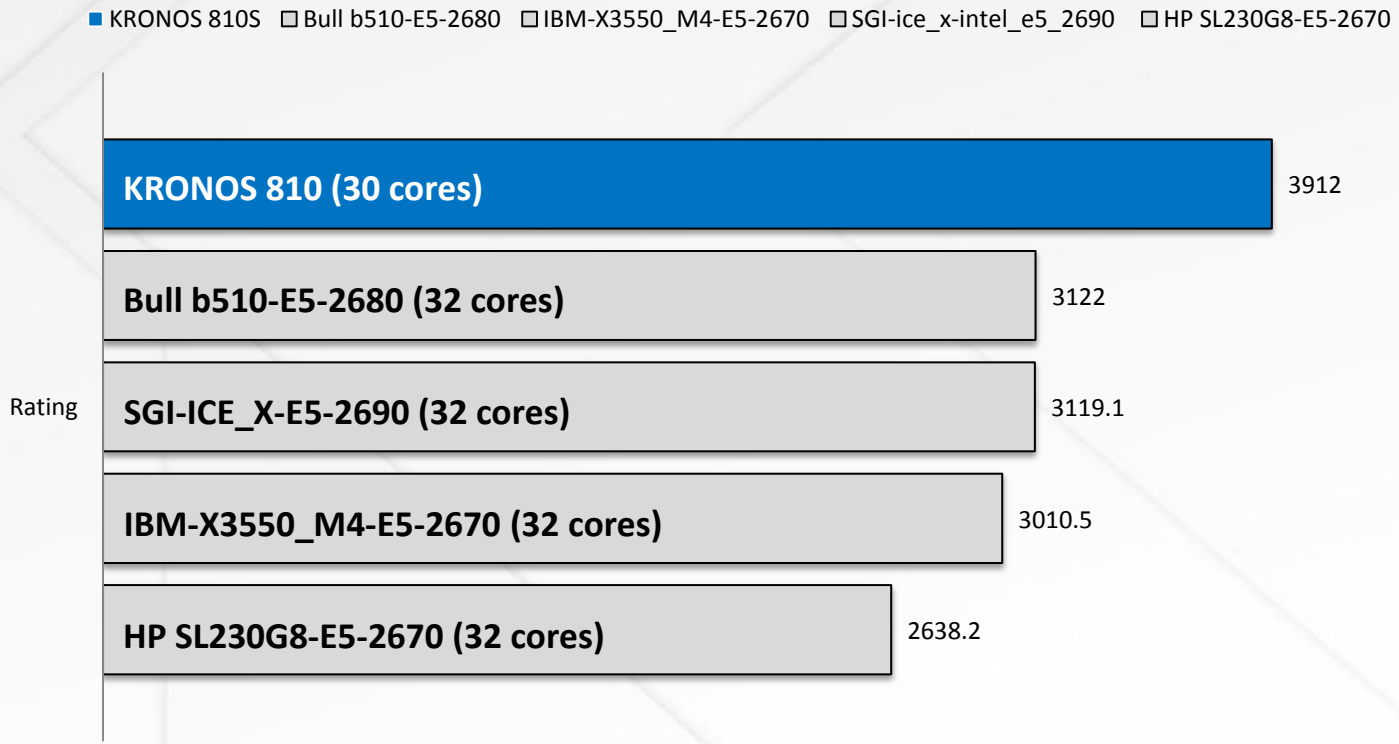
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #3 - External Flow Over a Passenger Sedan

KRONOS 810 vs. Competition:



Rating number – Higher is better

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IBM x3550 M4 with Intel E5-2670 processor, 2.60 GHz, 128Gb, RHEL 6.1 using Infiniband, with Turbo mode
SGI ICE-X with Intel E5-2690 processor, 2.9GHz, 128GB, SLES11-SP1 using Infiniband without Turbo mode

Test #4 - External Flow Over a Truck Body w/ Polyhedral Mesh

- **Problematic:**
  - Number of cells: **14M**
  - Cell type: **Mixed**
  - Model: **DES turbulence**
  - Solver: **Segregated implicit**
  - Solver rating based on 25 iterations

Link to official ANSYS results

Test #4 - External Flow Over a Truck Body w/ Polyhedral Mesh

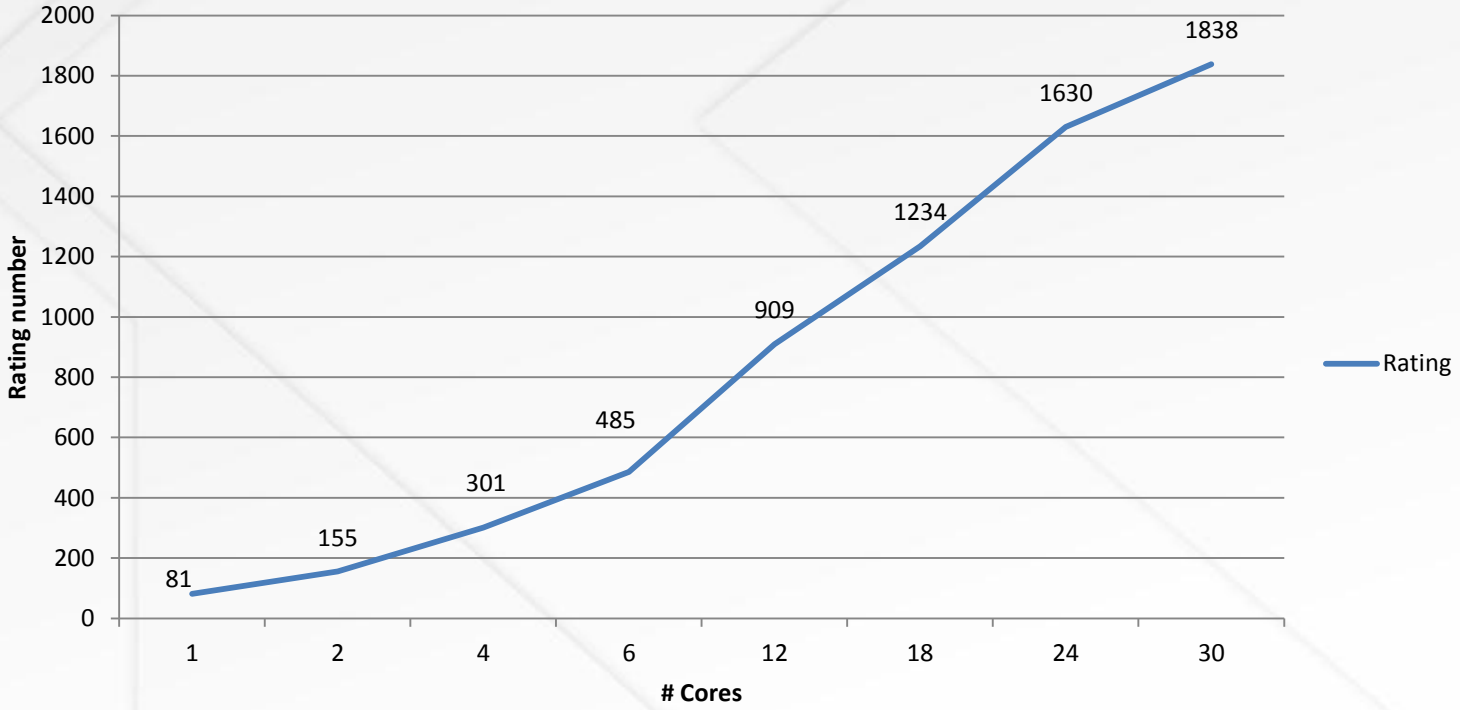
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
1	1062	81	**1.00**
2	556	155	**1.91**
4	287	301	**3.70**
6	178	485	**5.97**
12	95	909	**11.18**
18	70	1234	**15.17**
24	53	1630	**20.04**
30	47	1838	**22.60**

Elapsed Time (sec) - Lower is better

Test #4 - External Flow Over a Truck Body w/ Polyhedral Mesh

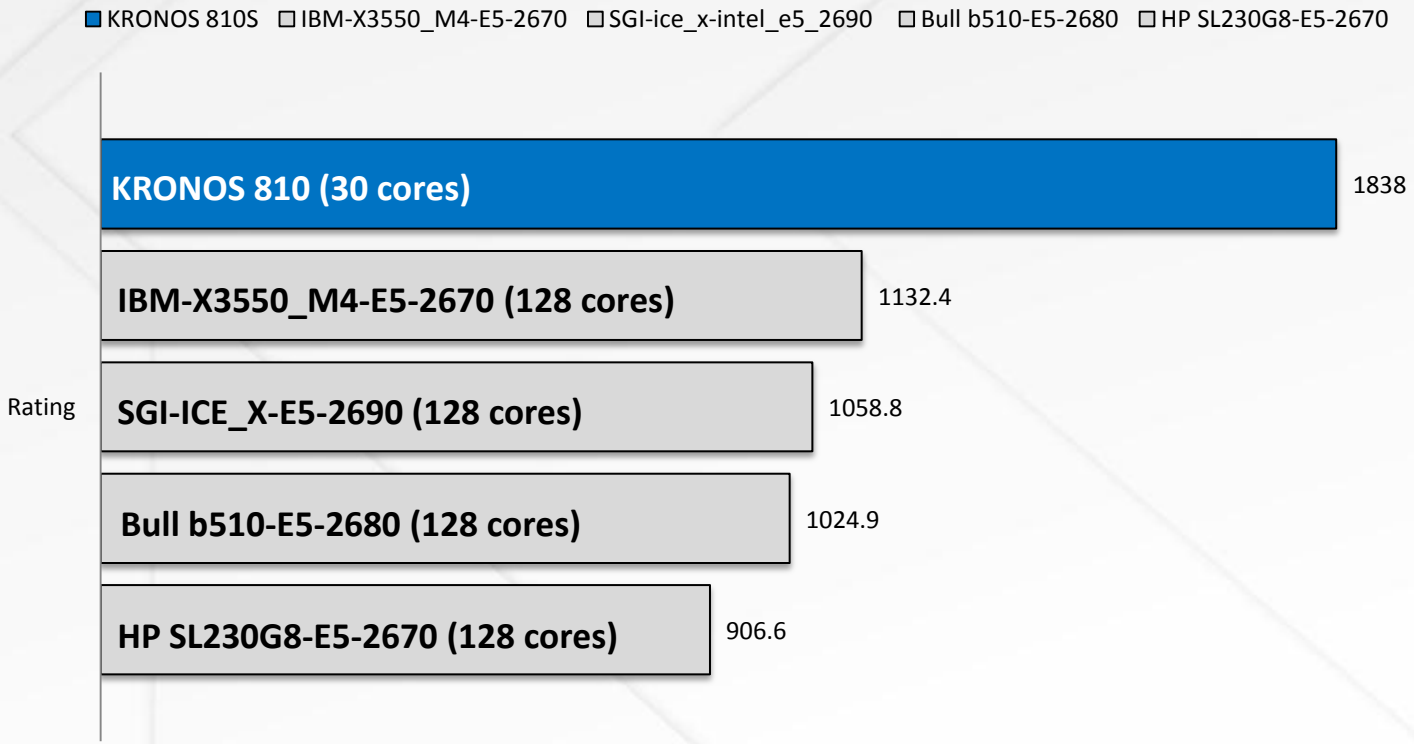
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #4 - External Flow Over a Truck Body w/ Polyhedral Mesh

KRONOS 810 vs. Competition:



Rating number – Higher is better

Bull B510 with Intel E5-2680 processor, 2.7GHz,64Gb, RHEL6 using QDR Infiniband with Turbo mode
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SGI ICE-X with Intel E5-2690 processor, 2.9GHz, 128GB, SLES11-SP1 using Infiniband without Turbo mode

Test #4 - External Flow Over a Truck Body w/ Polyhedral Mesh

	KRONOS (30 cores)	HP (128 cores)	IBM (128 cores)
Rating Number	**1694**	**966.4**	**1234.3**
Hardware and OS costs	**$ 36,000.00**	**$ 108,000.00**	**$ 98,600.00**
Lower cost is better			

75% More performance

1/3 of the Cost

Comparison based on web pricing from HP, IBM as of 21 August 2013

Test #5 - External Flow Over a Truck Body 14M

- **Problematic:**
  - Number of cells: **14M**
  - Cell type: **Mixed**
  - Model: **DES turbulence**
  - Solver: **Segregated implicit**
  - Solver rating based on 20 iterations

Link to official ANSYS results

Test #5 - External Flow Over a Truck Body 14M

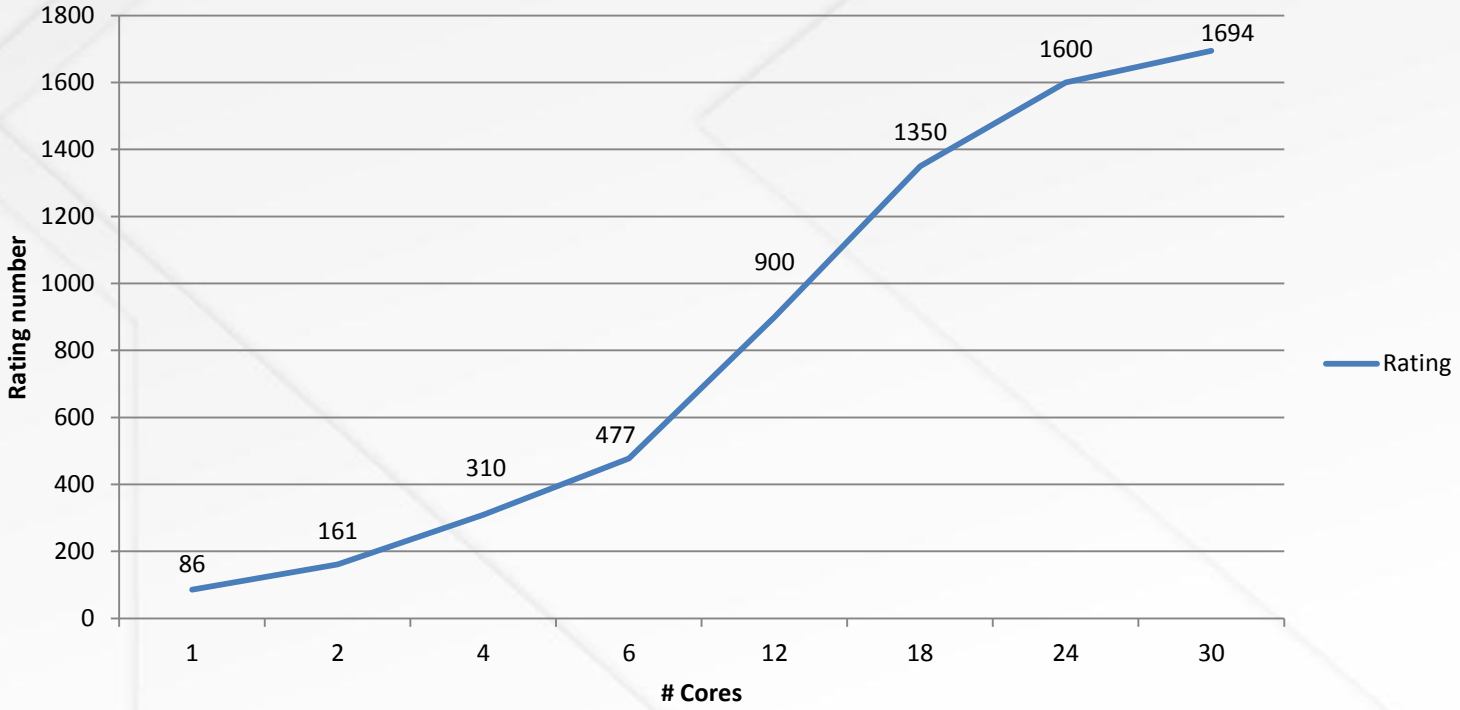
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
1	1009	86	**1.00**
2	536	161	**1.88**
4	279	310	**3.62**
6	181	477	**5.57**
12	96	900	**10.51**
18	64	1350	**15.77**
24	54	1600	**18.69**
30	51	1694	**19.78**

Elapsed Time (sec) - Lower is better

Test #5 - External Flow Over a Truck Body 14M

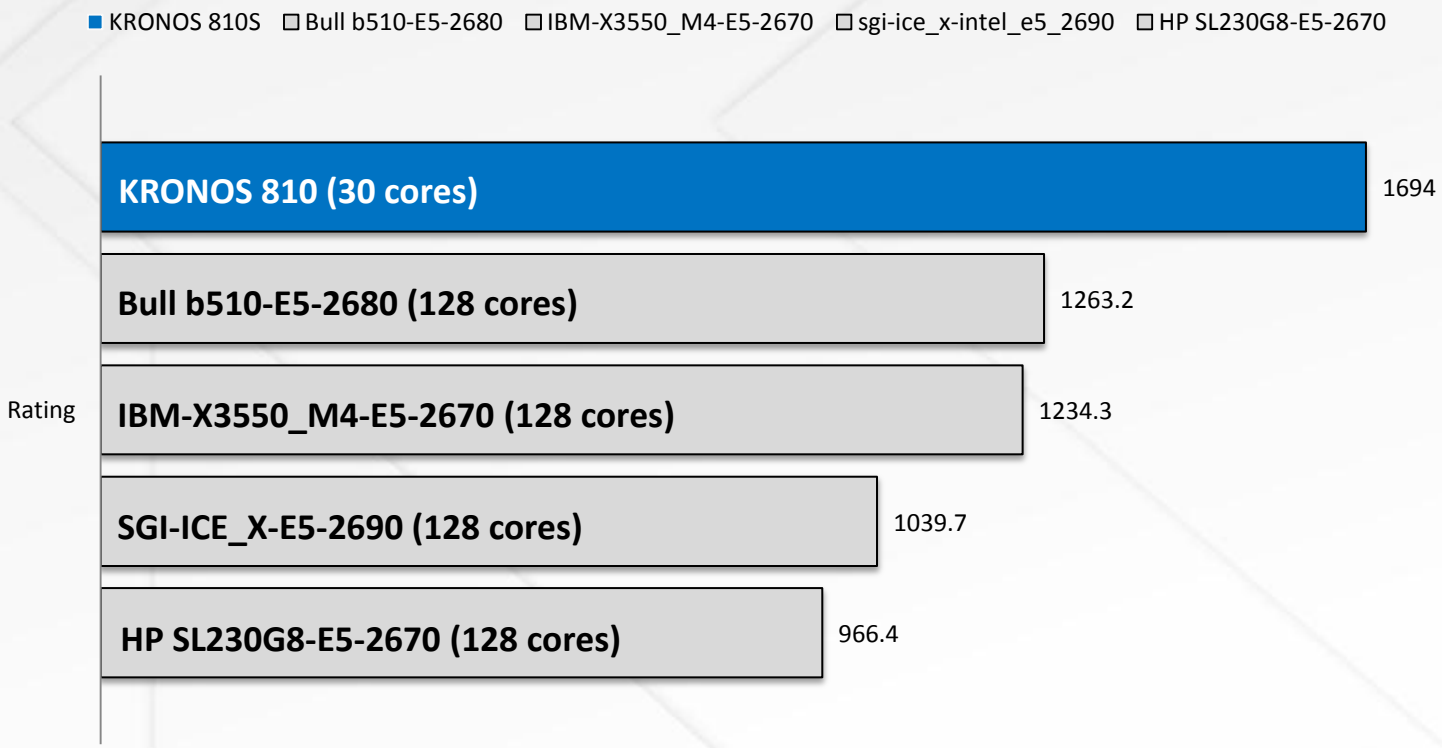
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #5 - External Flow Over a Truck Body 14M

KRONOS 810 vs. Competition:



Rating number – Higher is better

Bull B510 with Intel E5-2680 processor, 2.7GHz,64Gb, RHEL6 using QDR Infiniband with Turbo mode
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SGI ICE-X with Intel E5-2690 processor, 2.9GHz, 128GB, SLES11-SP1 using Infiniband without Turbo mode

Test #5 - External Flow Over a Truck Body 14M

	KRONOS (30 cores)	HP (128 cores)	IBM (128 cores)
Rating Number	**1838**	**906.6**	**1132.4**
Hardware and OS costs	**$ 36,000.00**	**$ 108,000.00**	**$ 98,600.00**
Lower cost is better			

Twice the performance

1/3 of the Cost

Comparison based on web pricing from HP, IBM as of 21 August 2013

Test #6 - External Flow Over a Truck Body 111M

- **Problematic:**
  - Number of cells: **111M**
  - Cell type: **Mixed**
  - Model: **DES turbulence**
  - Solver: **Segregated implicit**
  - Solver rating based on 20 iterations

Link to official ANSYS results

Test #6 - External Flow Over a Truck Body 111M

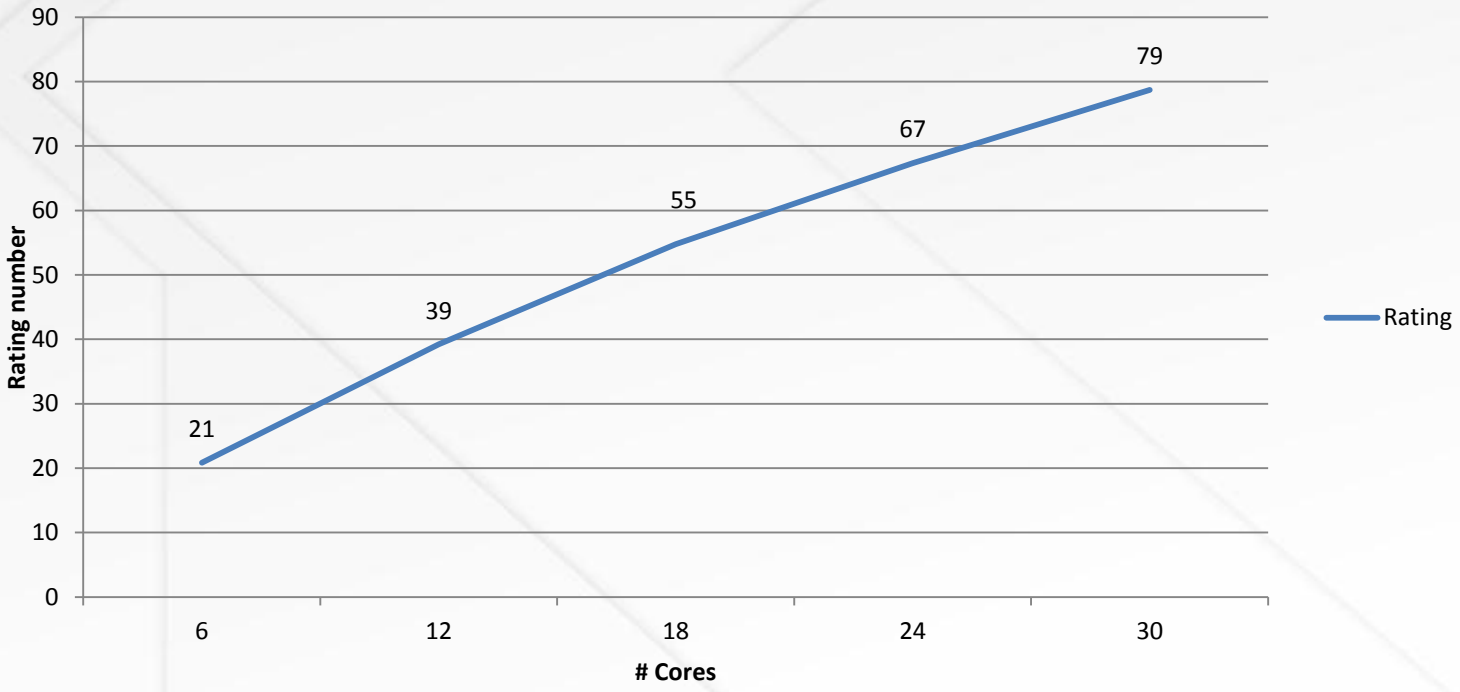
Result on the KRONOS 810 :

# Cores	Elapsed Time (sec)	Solver Rating	Core solver SPEED UP
6	4145	21	**1.00**
12	2203	39	**1.88**
18	1578	55	**2.63**
24	1283	67	**3.23**
30	1098	79	**3.78**

Elapsed Time (sec) - Lower is better

Test #6 - External Flow Over a Truck Body 111M

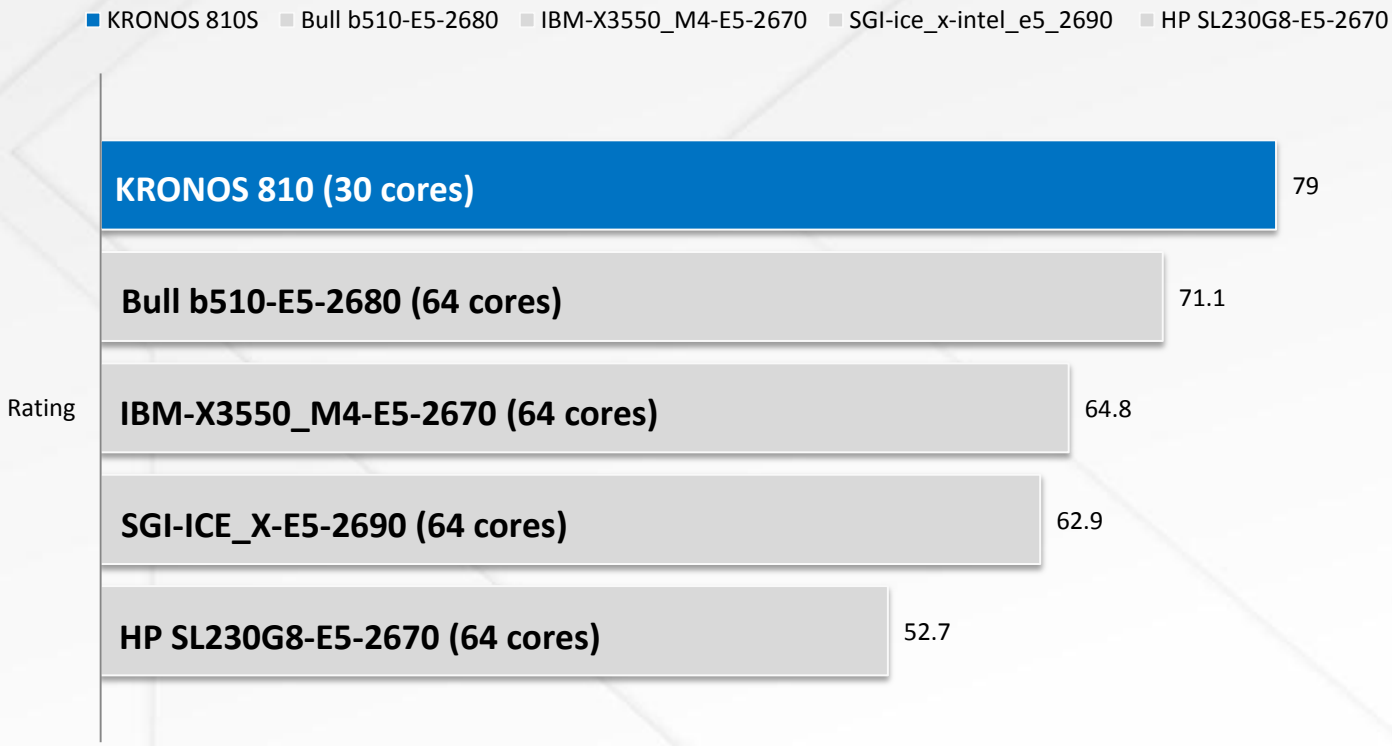
Scalability result on the KRONOS 810 :



Rating number – Higher is better

Test #6 - External Flow Over a Truck Body 111M

KRONOS 810 vs. Competition:



Rating number – Higher is better

Bull B510 with Intel E5-2680 processor, 2.7GHz,64Gb, RHEL6 using QDR Infiniband with Turbo mode
HP SL230G8 with Intel E5-2670 processor, 2.6GHz, 64Gb_1333Mhz Memory, RHEL 6.2 using FDR Infiniband without Turbo mode
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SGI ICE-X with Intel E5-2690 processor, 2.9GHz, 128GB, SLES11-SP1 using Infiniband without Turbo mode

Test #6 - External Flow Over a Truck Body 111M

	KRONOS (30 cores)	HP (64 cores)	IBM (64 cores)
Rating Number	79	52.7	64.8
Hardware and OS costs	$ 36,000.00	$ 54,000.00	$ 51,800.00
Lower is better			

50% More performance

1/2 of the Cost

Taking advantage of ANSYS HPC Packs

The KRONOS 810S outpaces all competitors in terms of compute time and efficiency as shown with benchmarks.

By switching your hardware with the KRONOS 810S, you will instantly unlock the highest levels of ANSYS simulation performance a single machine can deliver.

With a perfectly mastered solution, you are now able to get the most out of ANSYS by simply upgrading your HPC pack, in order to **improve** product quality with more design simulations, **accelerate** time to market by reducing engineering cycles, **develop** high fidelity models with practical solution times.

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