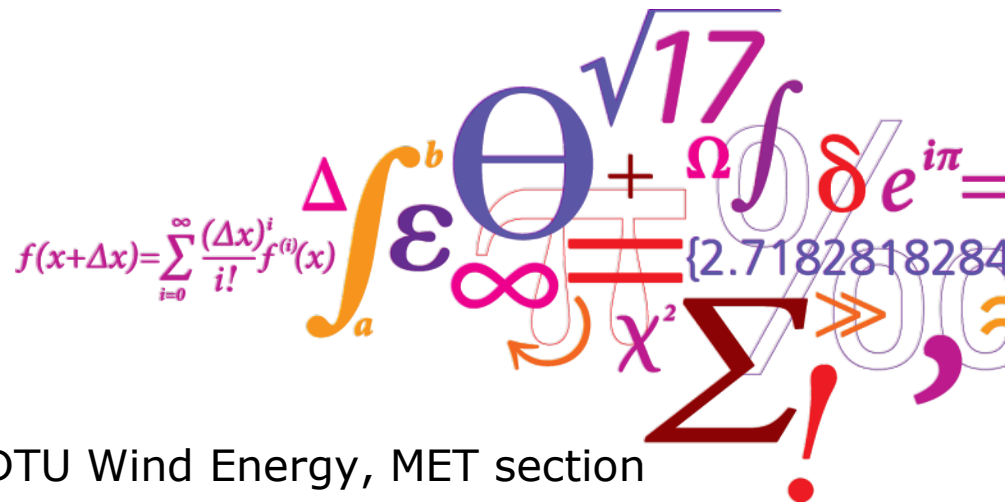


New High Performance Computing (HPC) facility at DTU Campus Risø



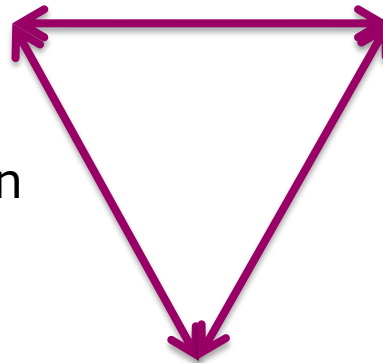
Presented by Senior Researcher

Dalibor Cavar, DTU Wind Energy, MET section

The “*HPC committee*” involved in the project

AIT Campus Risø

- **Michael Rasmussen**
- Anne Margrethe Larsen
- Henrik Olsen



DTU Wind Energy

- Thomas Bull
- Niels N. Sørensen
- **Dalibor Cavar**

Finance and Accounting

- **John Tandrup Riedel**

Software packages used on HPC facilities

- Locally developed and maintained at DTU Wind Energy
 - **EllipSys3D** (CFD)
 - **HAWC II** (Multi body aero elastic program)
- Open Source Software Packages
 - **WRF**, Weather forecasting software ("*CFD*")
 - **OpenFOAM** (CFD)
- Commercial Software Packages
 - **MATLAB**
 - **ABAQUS**
 - **MSC/MARC**

New HPC facility at DTU Risø Campus



- **Name** of The New Cluster is **JESS**
- The name is a tribute to **Jess A. Michelsen** (1959-2005)
- **288** compute nodes:
 - Each with **two Intel Xeon e5-2680v2** ten-core **2.8 GHz** processors,
 - **64 GB** RAM,
 - one **500 GB** internal SATA 6G disk
- **32** compute nodes:
 - Each with **two Intel Xeon e5-2680v2** ten-core **2.8 GHz** processors,
 - **128 GB** RAM,
 - one **1000 GB** internal SATA 6G disk
- **Total** of **320** compute nodes

New HPC facility at DTU Risø Campus (II)



- Theoretical Peak performance: app. **144 TFLOPS**
- Current tests were able to reproduce **app. 80%** of the Theoretical Peak performance (AIT is working on improving it).
- Cluster network: : High Speed, Low Latency 40 Gb/s QDR **InfiniBand**
- File server and disk storage: Connection by **InfiniBand** to the **Lustre** disk system **Mimer**
- Operating system: CentOS 6 based

The Top 500 Super Computer List

Rank	Site	System	Cores	Rmax (TFlop/s)	Rpeak (TFlop/s)
...					
271	Vestas Wind Systems A/S Denmark	iDataPlex DX360M3, Xeon X5670 6C 2.93 GHz, Infiniband QDR IBM	15672	162.1	183.7
...					
497	Government Canada	Cluster Platform 4000 BL465c, Opteron 6134 8C 2.30GHz, Gigabit Ethernet Hewlett-Packard	25472	118.1	234.3
498	Telecommunication Company China	Cluster Platform DL388p, Xeon E5-2609 4C 2.400GHz, Gigabit Ethernet Hewlett-Packard	11848	118.1	227.5
499	Software Company (M) United States	Cluster Platform DL380e Gen8, Xeon E5-2430L 8C 2.000GHz, Gigabit Ethernet Hewlett-Packard	15216	118.0	243.5
500	Banking (M) United States	Cluster Platform 3000 BL460c G7, Xeon X5650 6C 2.66GHz, Gigabit Ethernet Hewlett-Packard	22212	117.8	236.3
	DTU – Risø Campus JESS Cluster	HP Proliant SL230, Gen8, Intel Ivy-Bridge Xeon e5-2880v2 2.8 GHz, Qlogic QDR Infiniband Hewlett-Packard	6400	app. 115	app. 144

The Green 500 Super Computer List



Green500 Rank	MFLOPS/W	Site	Computer	Total Power (kW)
117	865.01	CSIR Centre for Mathematical Modelling and Computer Simulation	Cluster Platform 3000 BL460c Gen8, Xeon E5-2670 8C 2.60GHz, Infiniband FDR	386.56
118	851.89	TOTAL	Laure - SGI ICE X, Xeon E5-2670 8C 2.600GHz, Infiniband FDR	319.00
	App. 851.85	DTU – Risø Campus JESS Cluster	HP Proliant SL230, Gen8, Intel Ivy-Bridge Xeon e5-2880v2 2.8 GHz, Qlogic QDR Infiniband Hewlett-Packard	135
119	848.69	Sandia National Laboratories	Dark Bridge - Appro Xtreme-X Supercomputer, Xeon E5-2670 8C 2.600GHz, Infiniband QDR	315.90
120	846.15	Maui High-Performance Computing Center (MHPCC)	Riptide - iDataPlex DX360M4, Xeon E5-2670 8C 2.600GHz, Infiniband FDR	251.20
218	330.98	Vestas Wind Systems A/S	iDataPlex DX360M3, Xeon X5670 6C 2.93 GHz, Infiniband QDR	489.75

Real Test case

EllipSys3D

- New case defined/investigated in order to make a case "*meaningful*" to do the comparisons using almost all of the **JESS cluster** on.
- Based on one of the previous test cases – the Rotor Case:
 - But extended to app. **170 million** grid **points**
 - Two basic setups investigated:
 - A mesh consisting of **648** blocks of **64x64x64** grid points
 - And a mesh consisting of **5184** blocks of **32x32x32** grid points

