



**HEXAGON**



# **AWS Cluster Machine Performance**

Software Cradle Co., Ltd.

*CFD Center of Excellence*

*Design & Engineering Business Unit*

*Hexagon Manufacturing Intelligence*

16 Feb. 2021

# **AWS Cluster Machine Performance**

Parallel performance comparison with  
Cradle on-premise clusters

# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters

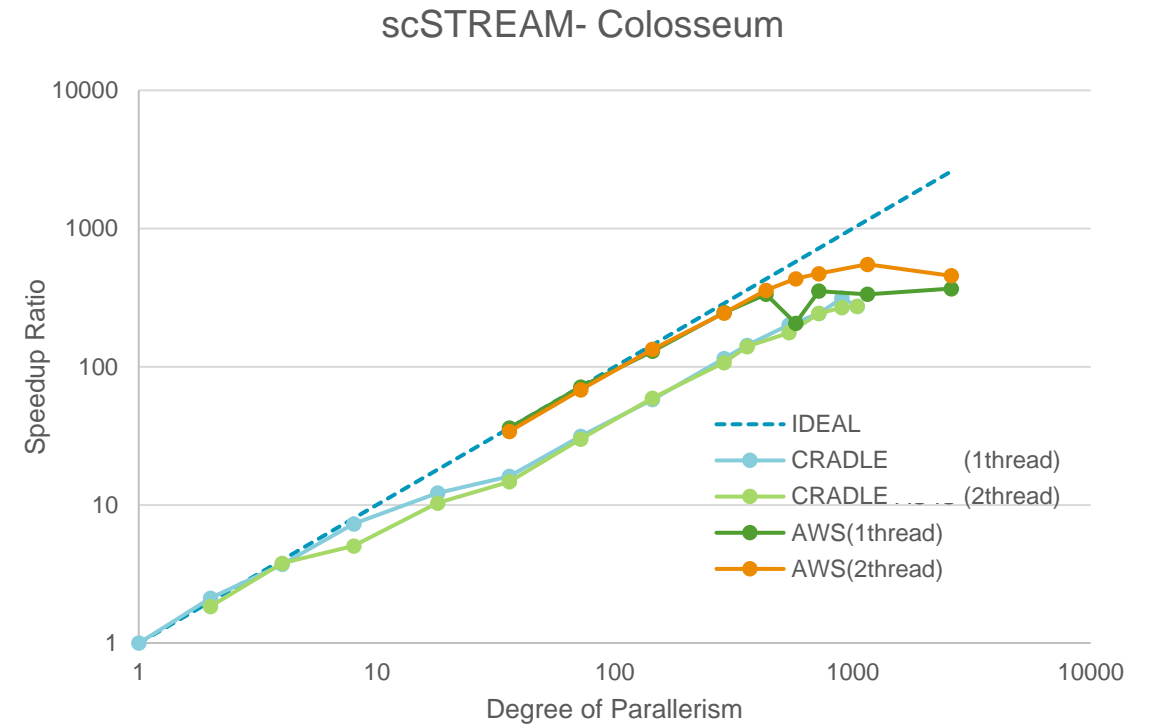
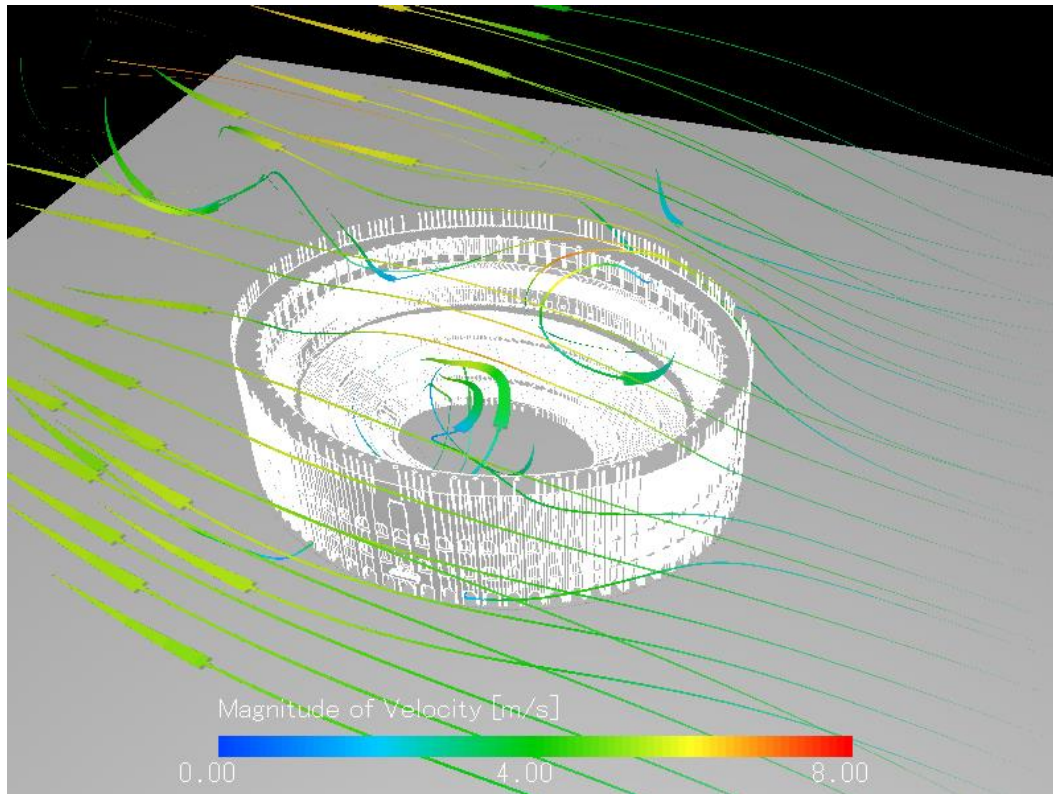
	<b>AWS:c5n.18xlarge Instance class</b>	<b>CRADLE on-premise</b>
<b>OS</b>	<b>Amazon Linux 2</b>	<b>CentOS7.3</b>
<b>CPU</b>	<b>Intel Xeon Platinum 8124M x2, 36core/node</b>	<b>Intel Xeon Gold 6140 x2, 36core/node</b>
<b>RAM</b>	<b>192GiB/node</b>	<b>96GB/node</b>
<b>Number of nodes</b>	<b>72</b>	<b>29</b>
<b>Maximum number of cores</b>	<b>2596</b>	<b>1044</b>
<b>Inter-node communication</b>	<b>Elastic Fabric Adapter (EFA)</b>	<b>Intel Omni Path(100Gbps)</b>
<b>MPI</b>	<b>Intel MPI 2019 update 7</b>	<b>Intel MPI 2018 update 5</b>
<b>Version of STREAM</b>	<b>V2021(20201224)</b>	<b>V2021(20201005)</b>
<b>Version of scFLOW</b>	<b>V2021(20201223)</b>	<b>V2021(20201008)</b>

AWS URL: [https://aws.amazon.com/ec2/instance-types/c5/?nc1=h\\_ls](https://aws.amazon.com/ec2/instance-types/c5/?nc1=h_ls)

# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scSTREAM solver

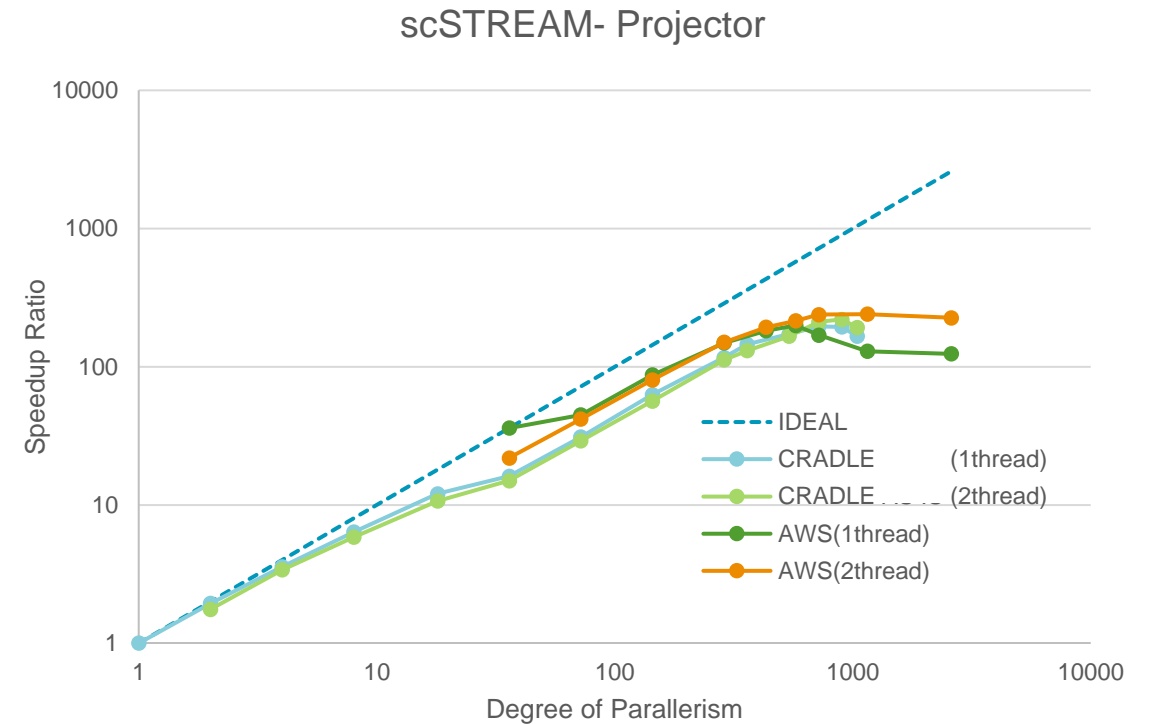
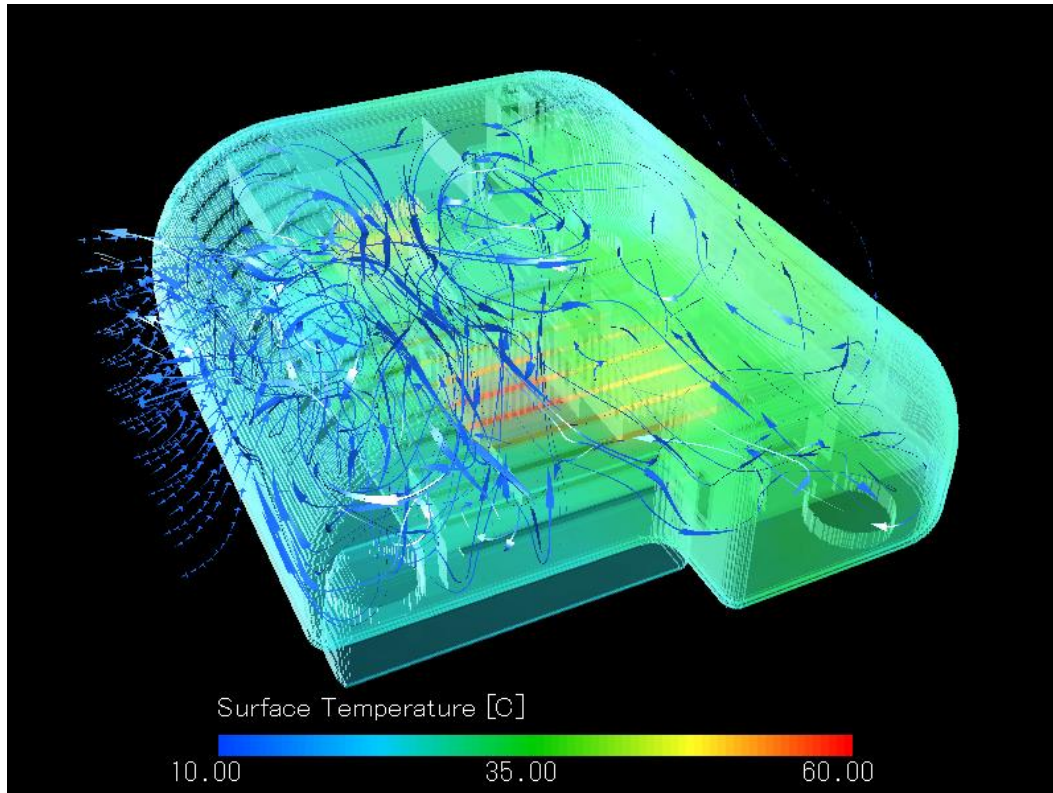
Wind analysis around the stadium:73,564,848 elements



# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scSTREAM solver

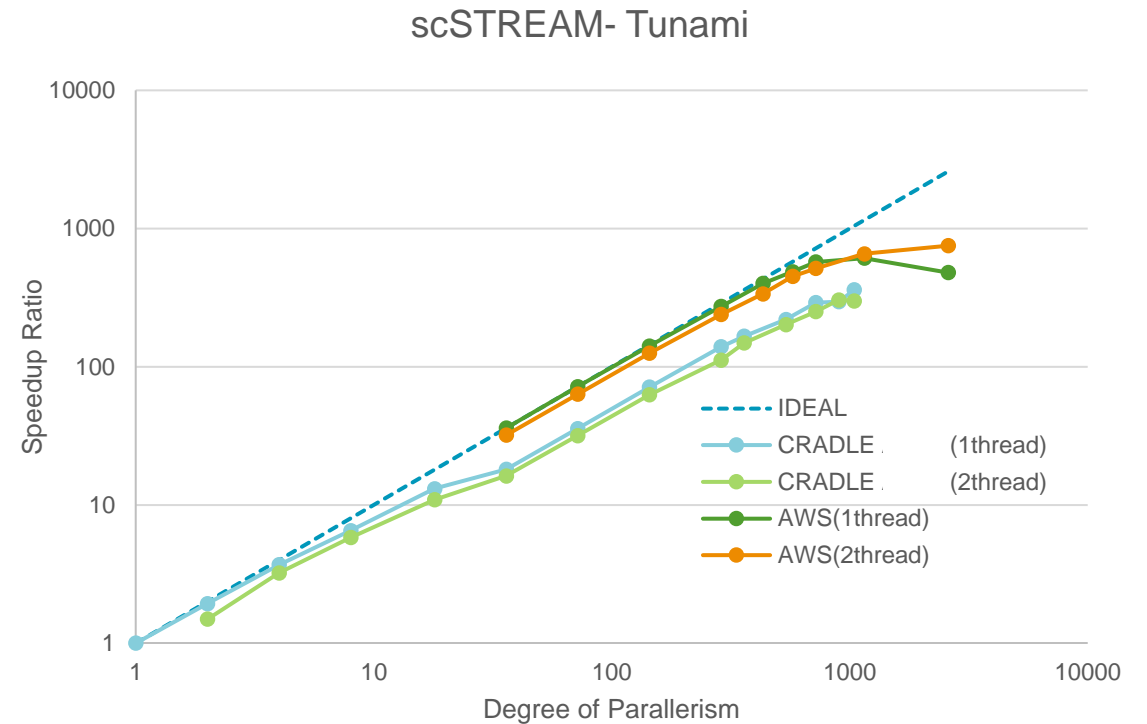
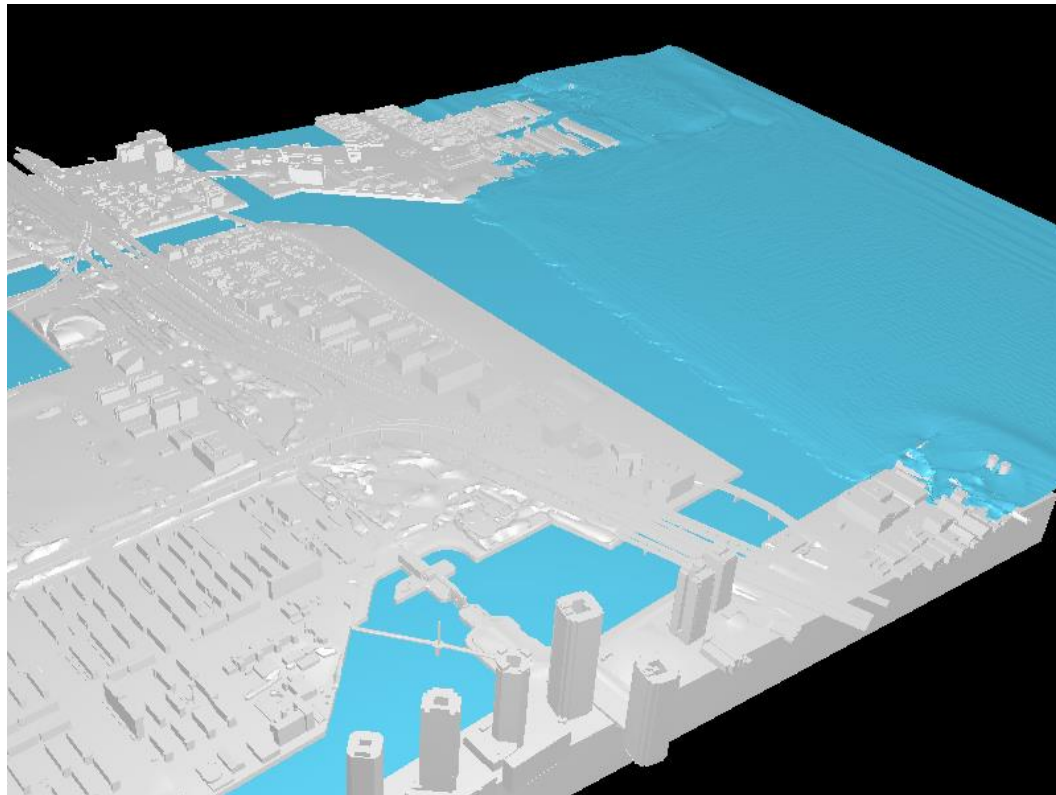
Thermal flow analysis of projector : 20,597,810 elements



# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scSTREAM solver

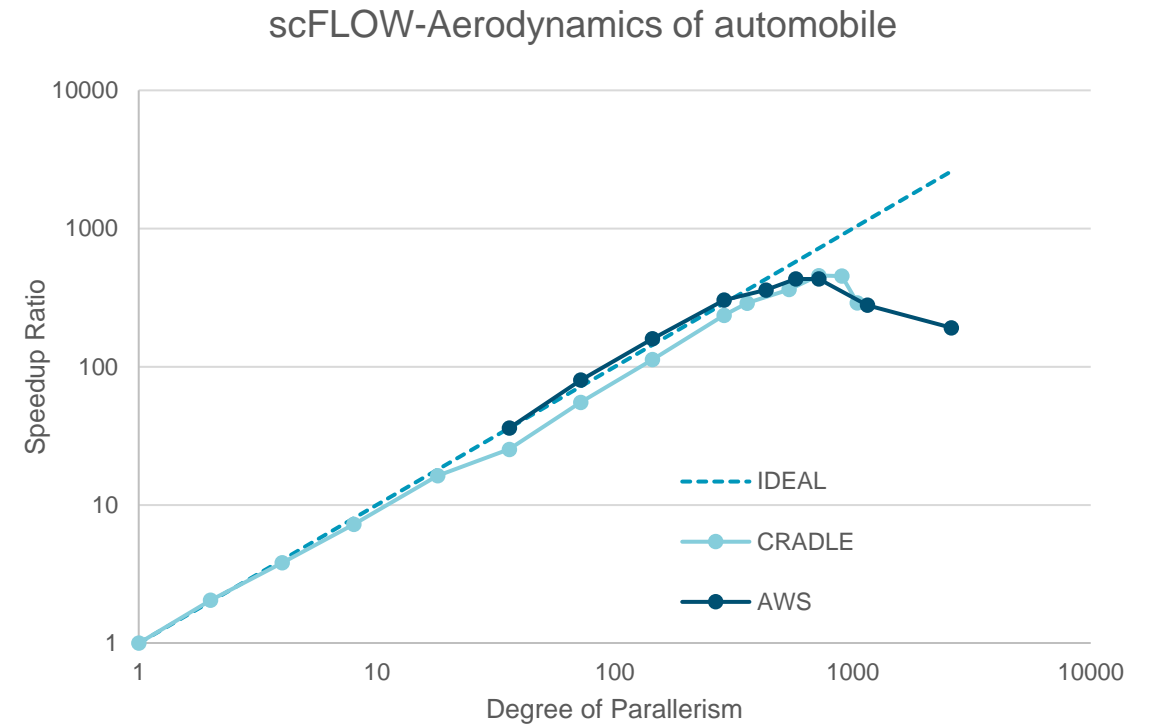
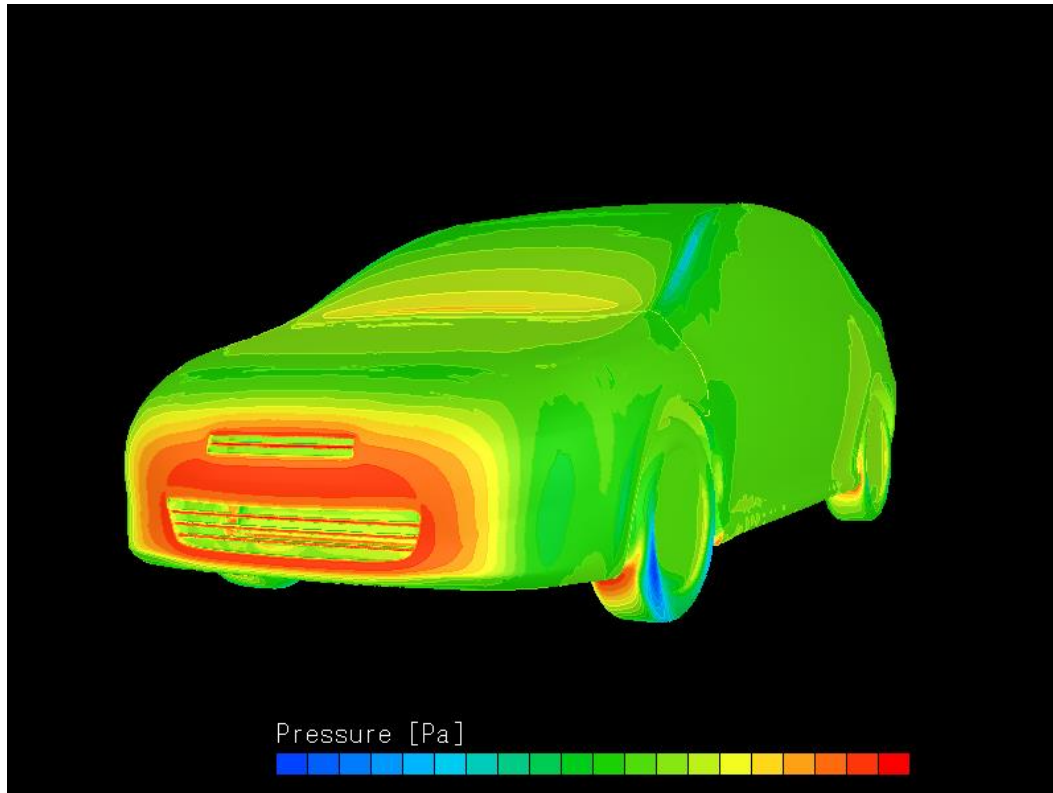
Tsunami analysis : 55,985,336 elements



# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scFLOW solver

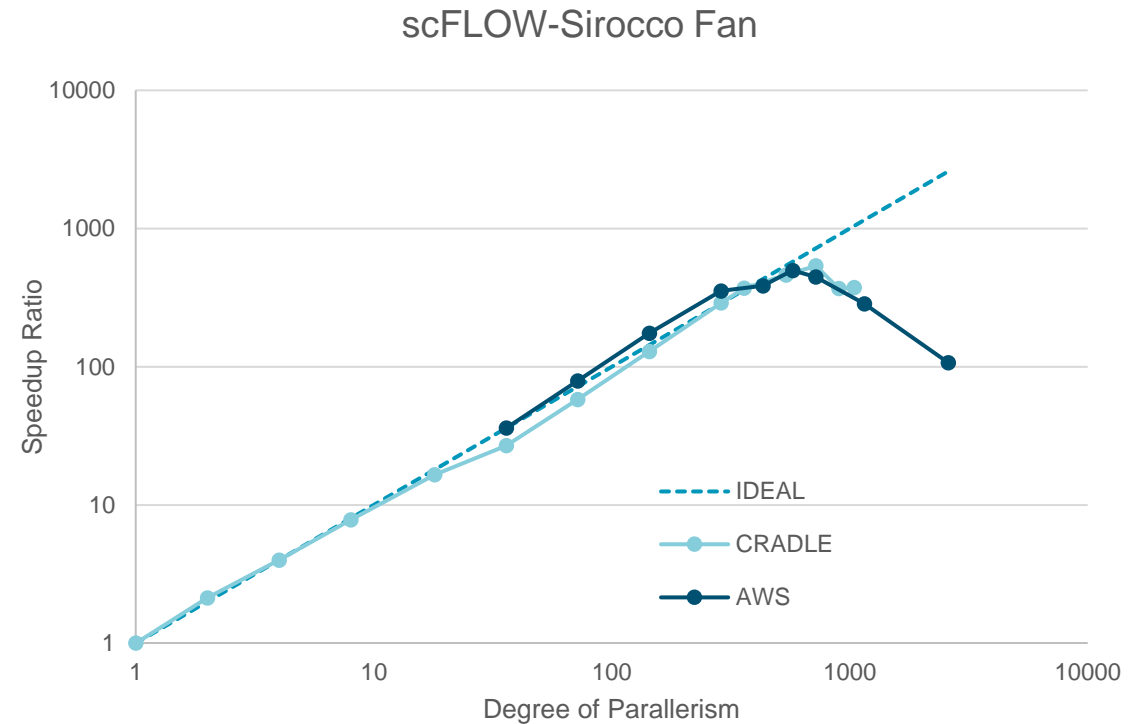
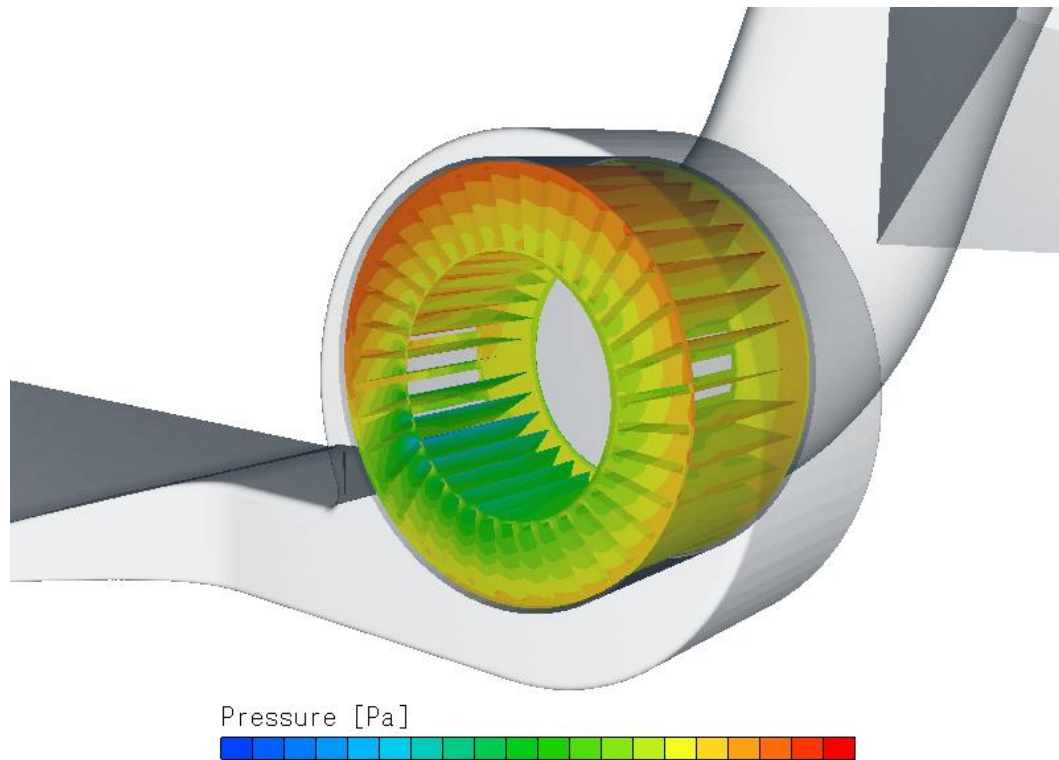
Vehicle aerodynamic analysis : 13,004,048 elements



# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scFLOW solver

**Sirocco fan analysis : 13,043,165 elements**

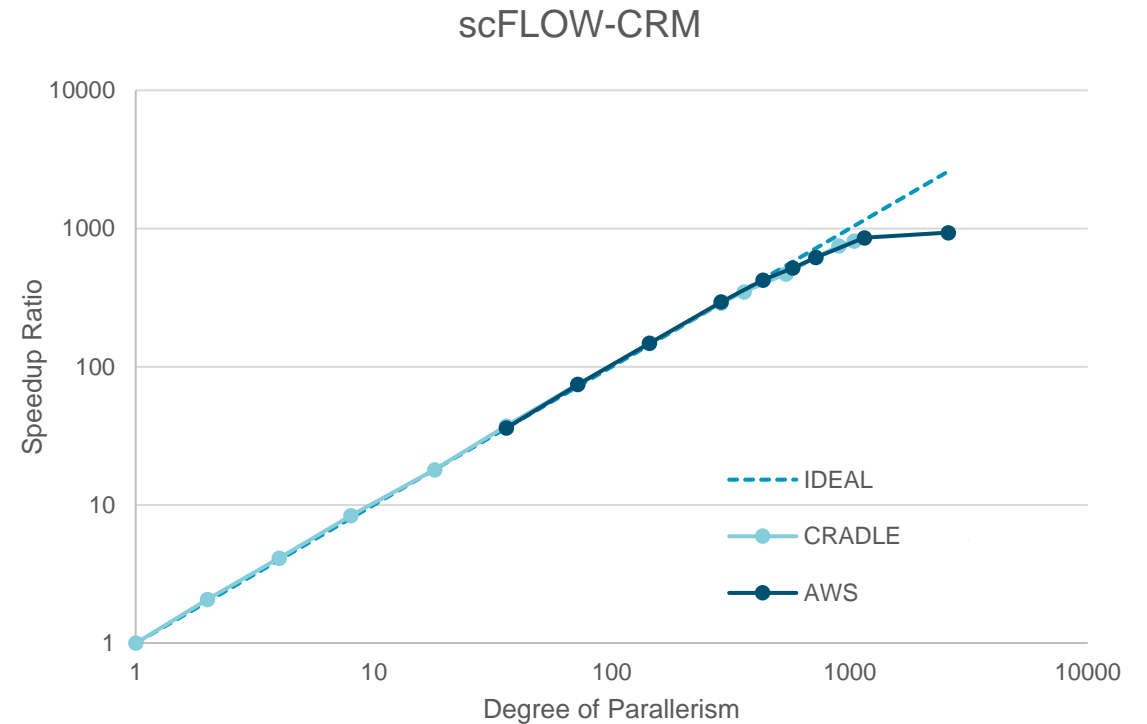
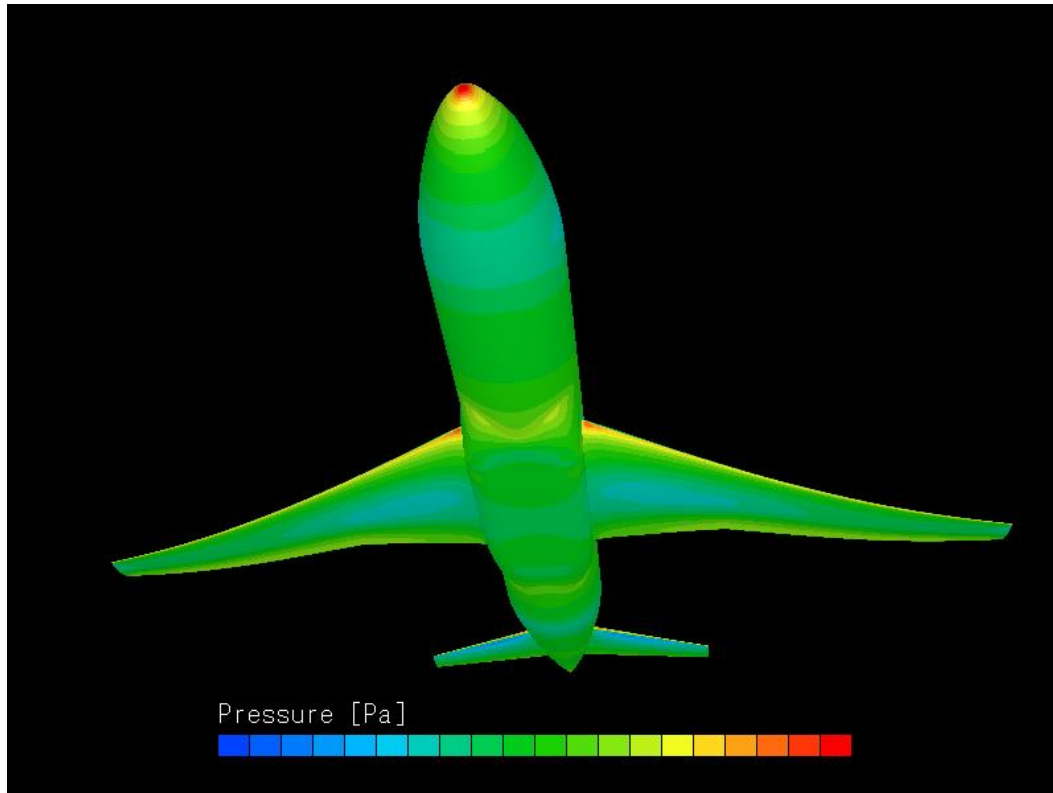




# AWS Cluster Machine Performance

Parallel performance comparison with Cradle on-premise clusters : scFLOW solver

Flow analysis around the aircraft : 14,083,711 elements



# **AWS Cluster Machine Performance**

Performance evaluation for large-scale models

# AWS Cluster Machine Performance

Performance evaluation for large-scale models

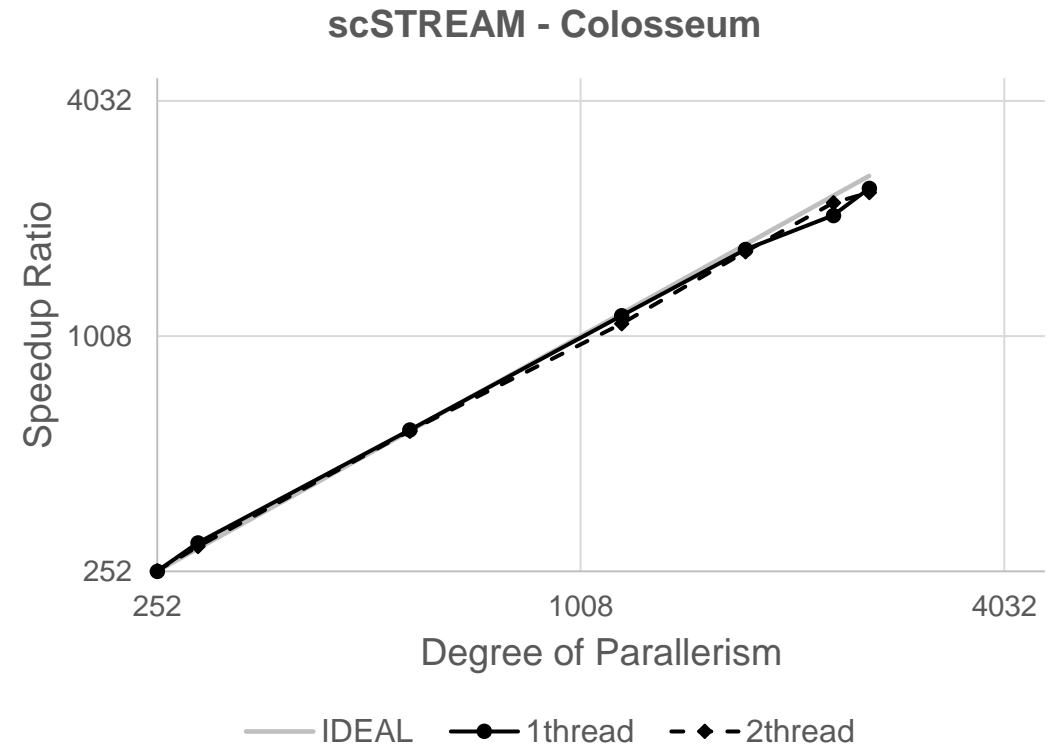
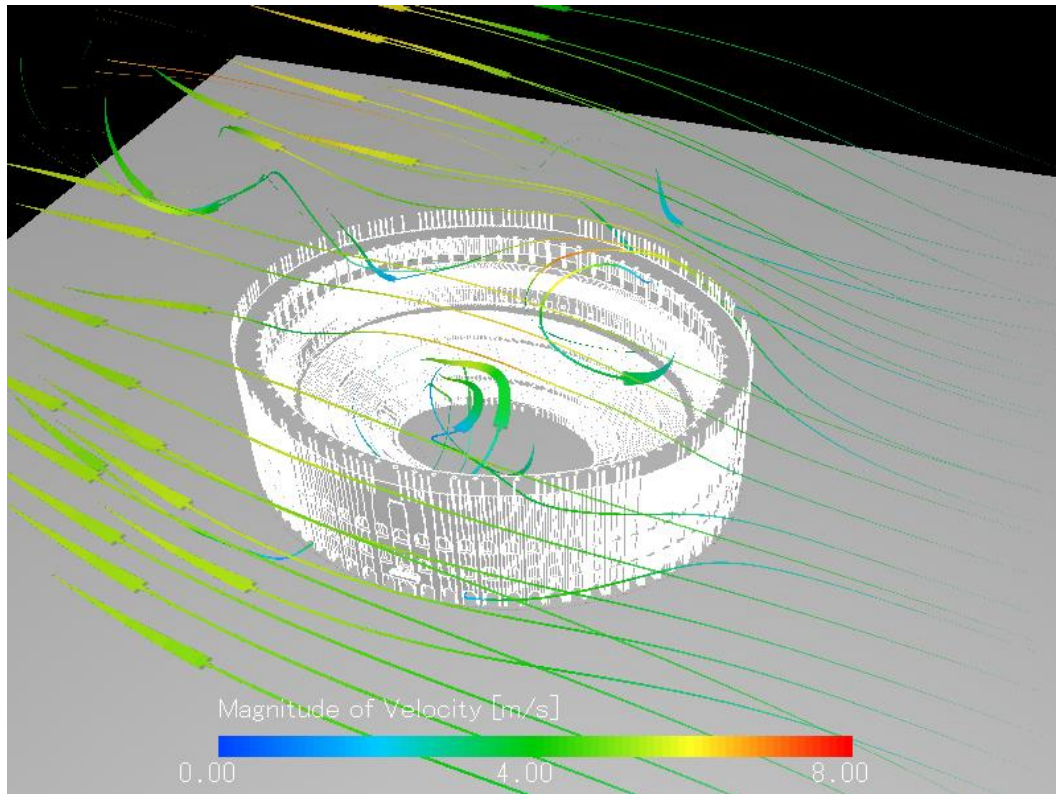
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Version of STREAM	V2021(20201224)
Version of scFLOW	V2021(20201223)

AWS URL: [https://aws.amazon.com/ec2/instance-types/c5/?nc1=h\\_ls](https://aws.amazon.com/ec2/instance-types/c5/?nc1=h_ls)

# AWS Cluster Machine Performance

Performance evaluation for large-scale models : scSTREAM solver

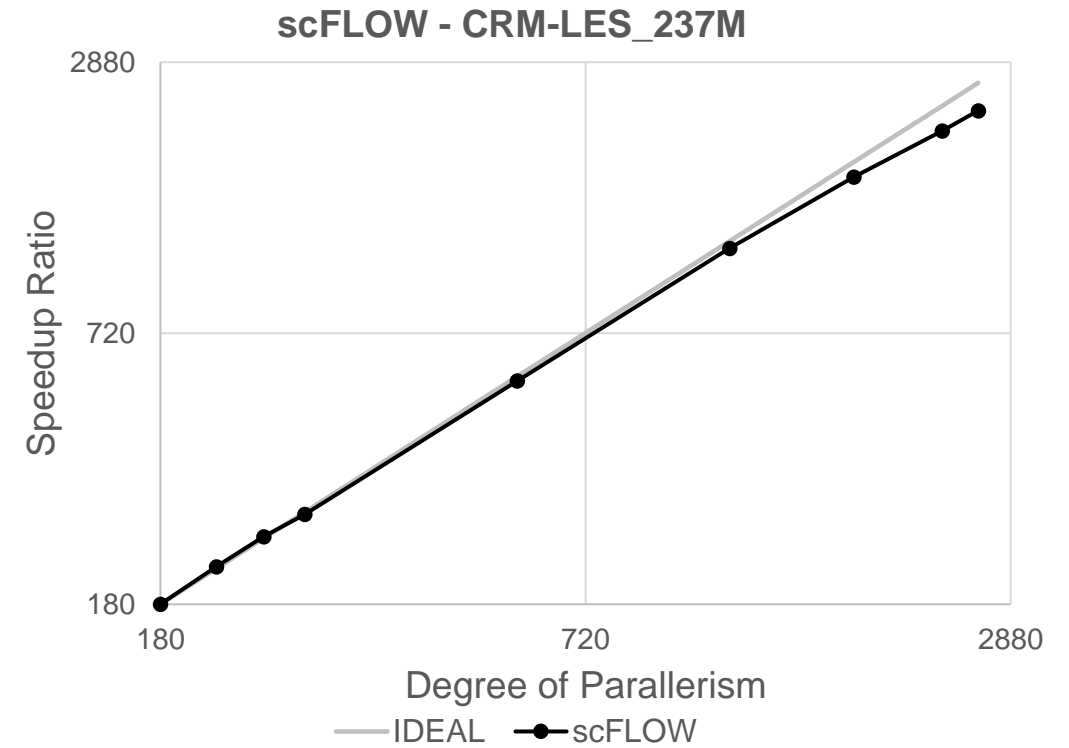
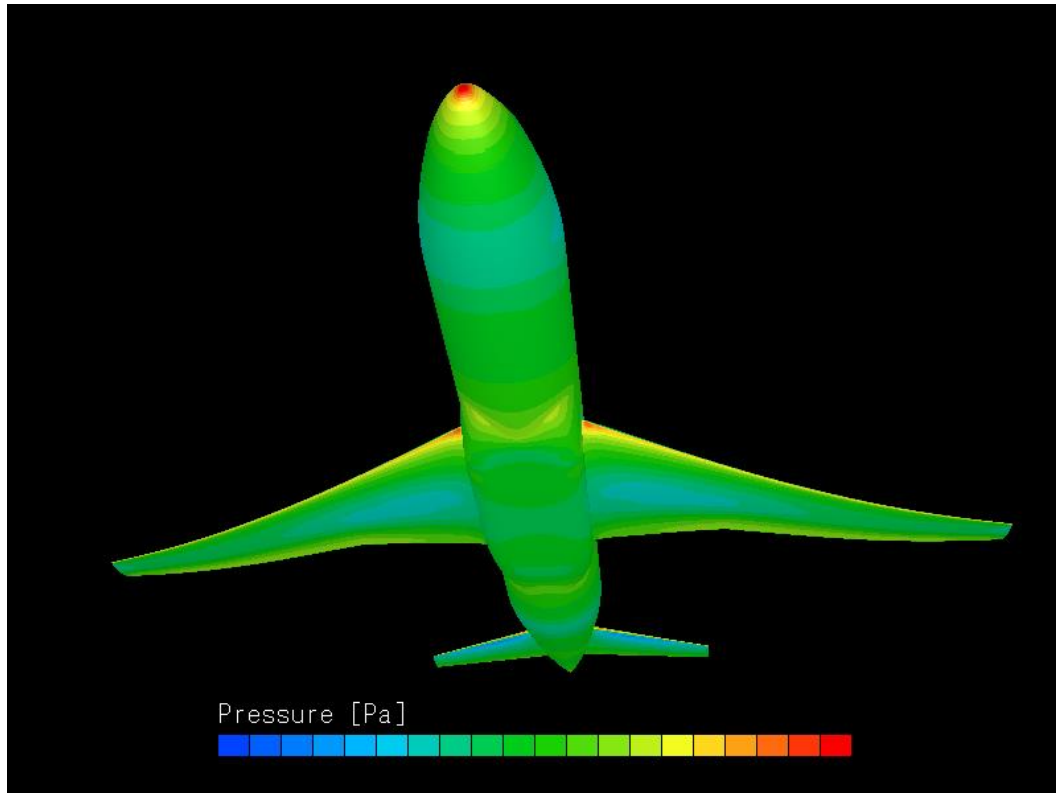
Wind analysis around the stadium : 2,107,442,400 elements



# AWS Cluster Machine Performance

Performance evaluation for large-scale models : scFLOW solver

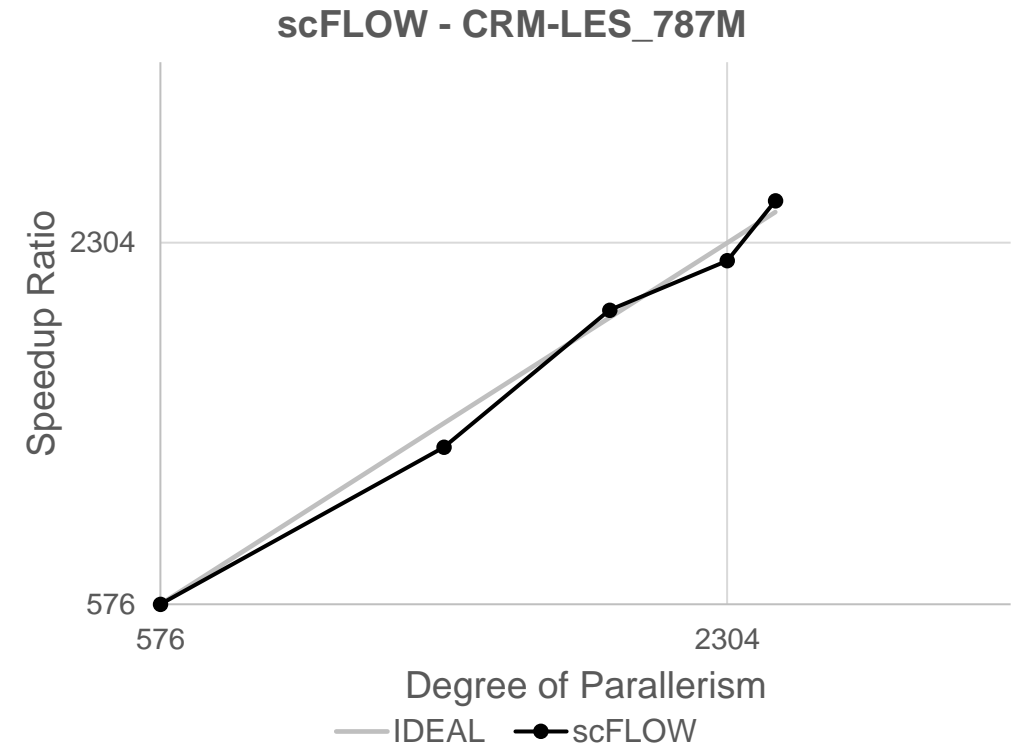
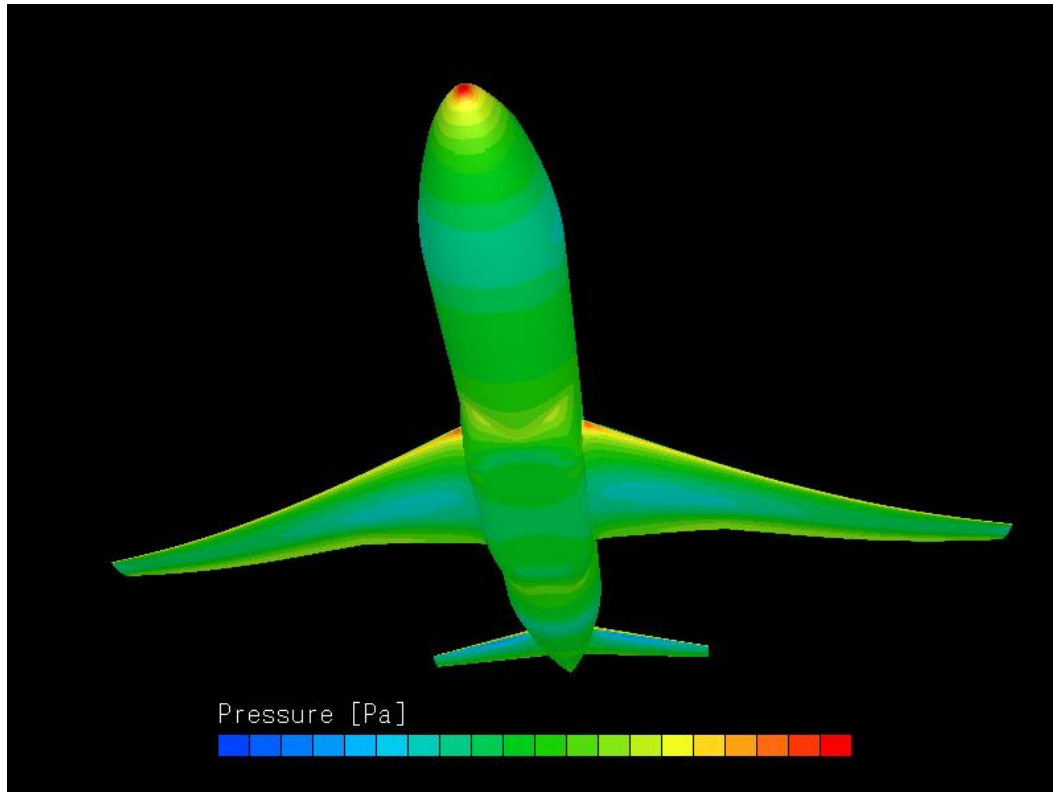
LES analysis around the aircraft : 237,412,720 elements



# AWS Cluster Machine Performance

Performance evaluation for large-scale models : scFLOW solver

LES analysis around the aircraft : 787,318,354 elements



\* No track record other than AWS (as of February 2021)